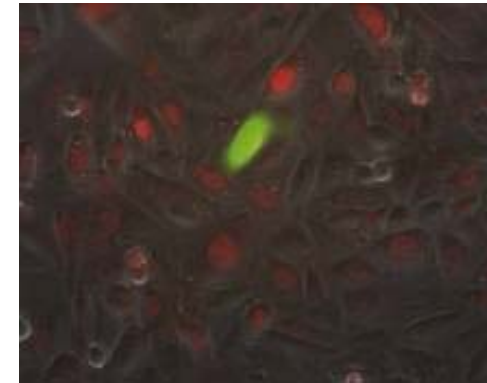
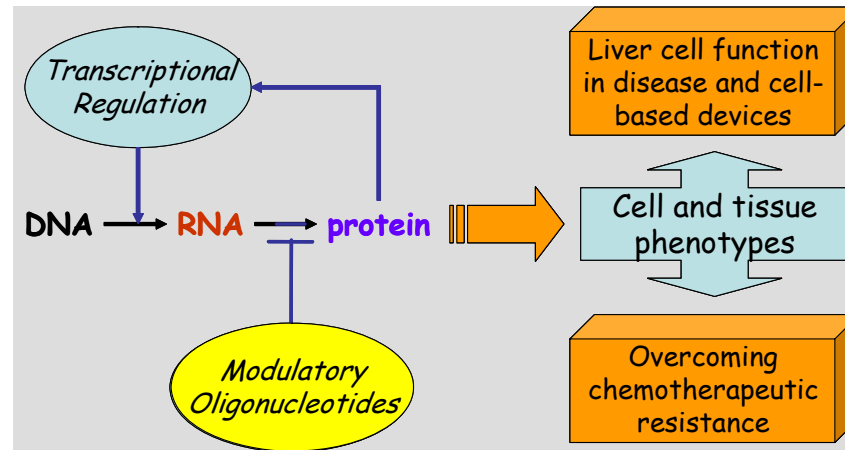
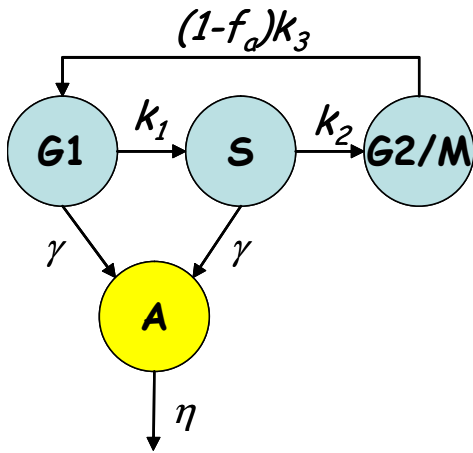


Molecular Systems Bioengineering Laboratory



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Department of Biomedical Engineering
Graduate Program in Molecular BioSciences
Rutgers University*

Molecular Systems Bioengineering

Biological Data

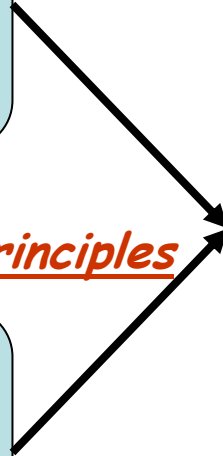
Genomes
Proteomes
Metabolomes
Transcriptomes

Applications

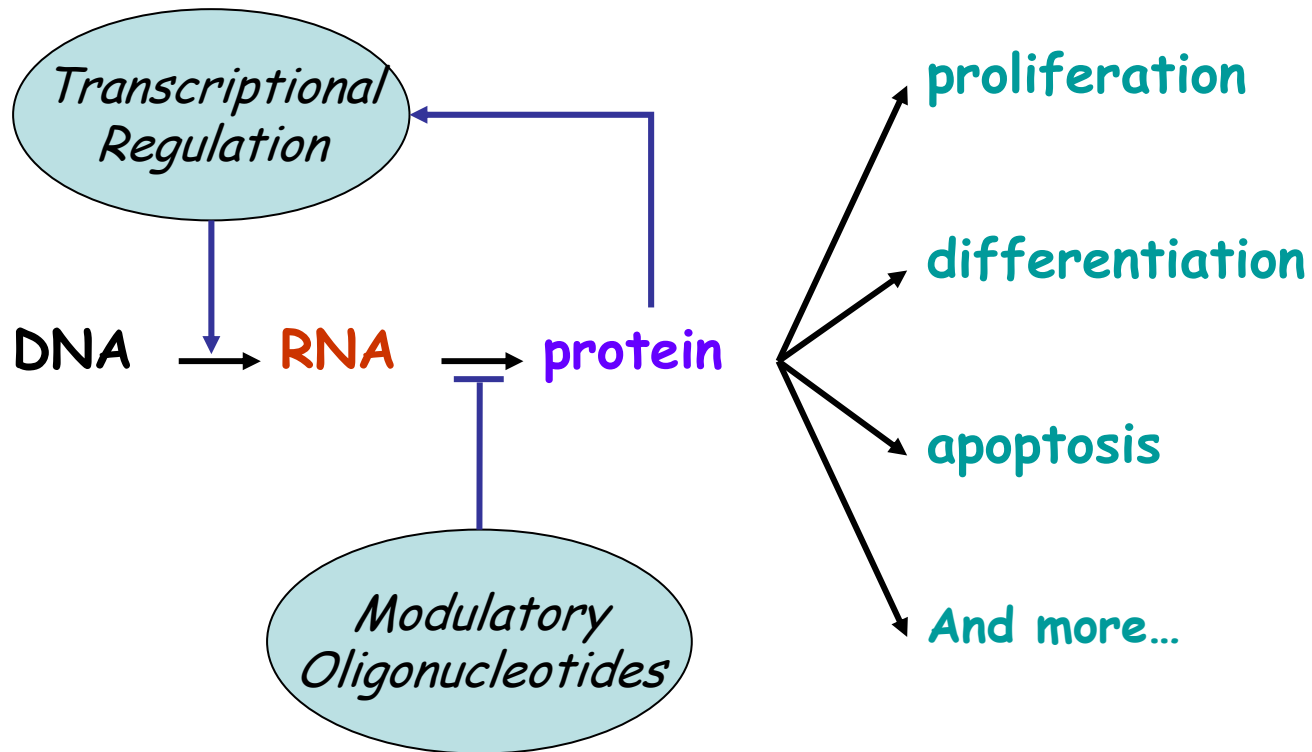
In silico simulation of cells
Medical diagnostics
Validation of drug targets
Targeted drug delivery
Personalized medicine

Engineering and Mathematical Principles

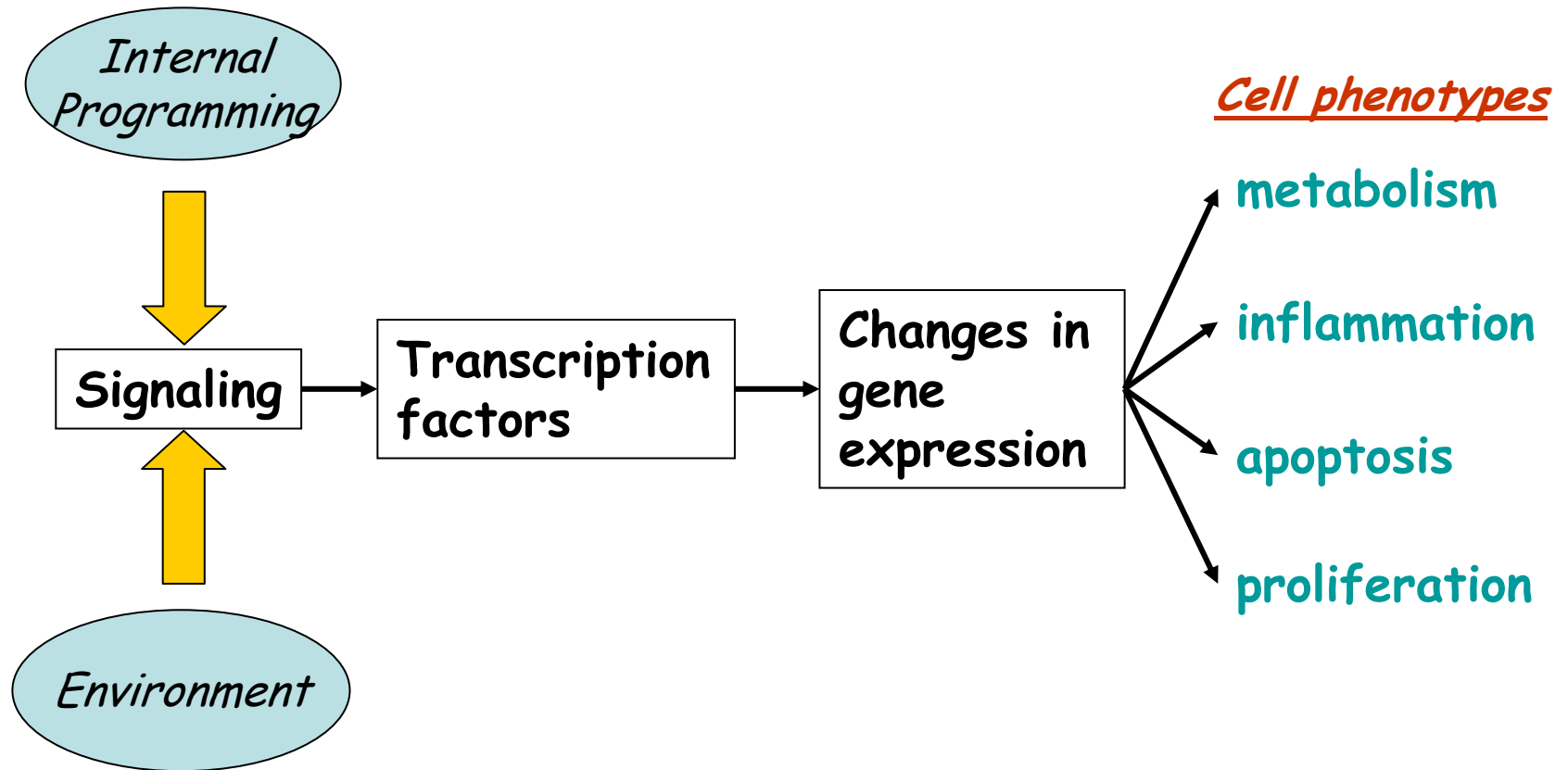
Thermodynamics
Chemical kinetics
Multivariate statistics
Network & control theory



Our Focus: Understanding & Controlling Gene Expression



Gene Regulation in Hepatocytes

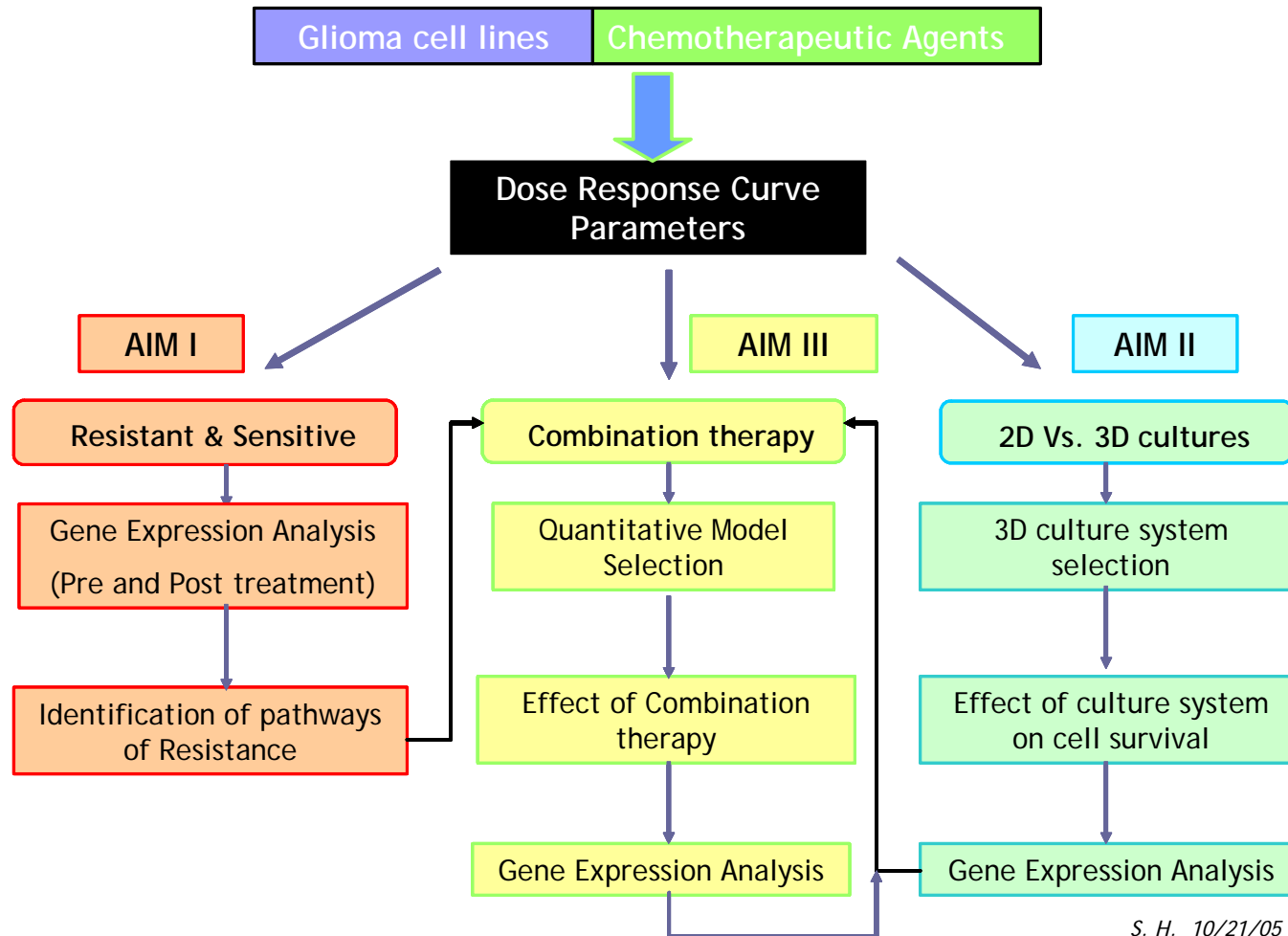


- Grad Students: Aina Andrianarijaona, Michelle Burley, Stephen Guzikowski, Joseph Vitolo, Hong Yang
- Collaborators: M. Ierapetritou (Rutgers CBE); I. Androulakis, S. Dunn, M. Yarmush (Rutgers BME)
- Funding: NSF CAREER Award (CR), NSF ME Program (CR, IA, MI, MY), NSF QSB Program (MI, CR, MY), NIH Biotechnology Training Fellowship (SG)

Critical Issues in Therapeutic Oligonucleotides

- Design of oligonucleotides with high affinity/kinetics for target mRNA
- Delivery of oligonucleotides to site of action
 - Polymer/DNA biophysics
 - Structure/activity relationships
 - Actuated intracellular release reagents
 - Peptide targeted delivery
- Postdoctoral Associate: Li Kim Lee
- Grad Students: Lavanya Peddada, Sumati Sundaram
- Collaborators: D. Devore and J. Kohn (NJ Center for Biomaterials)
- Funding: NIH R01 Grant, ACS-PRF Grant

Gene Expression in Chemotherapeutic Resistance



- Grad Student: Salaheldin Hamed
- Collaborators: D. Banerjee (UMDNJ Pharmacology)
- Funding: Charles & Johanna Busch Memorial Fund; NSF IGERT Training Fellowship