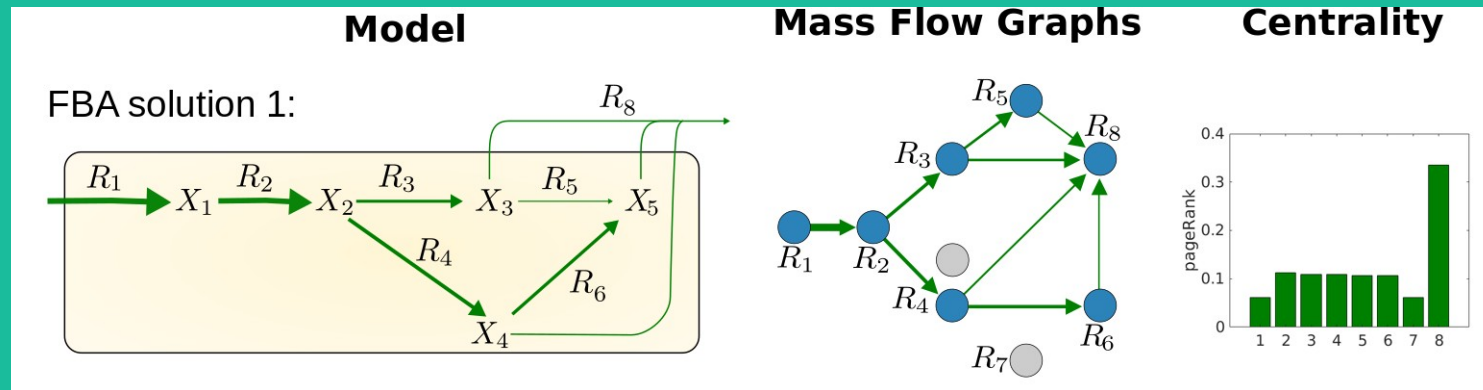


Denise Thiel

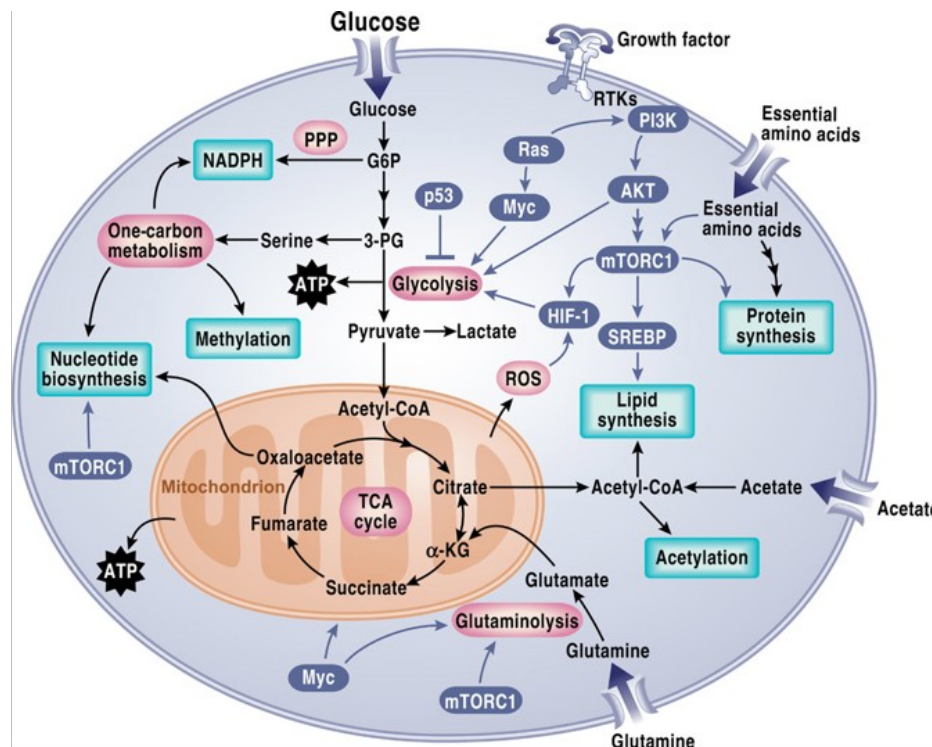


Predicting Essential Reactions in Cancer Metabolic Networks

Dr. Diego Oyarzún, Prof. Hector Keun, Prof. Mauricio Barahona

Cancer Metabolism

- **System of all biochemical reactions**
- **Aberrant metabolism is a hallmark of cancer**

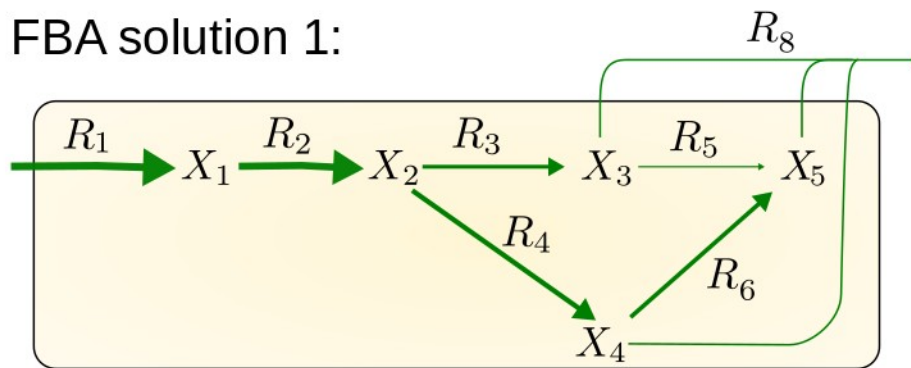


* DeBerardinis et al, Fundamentals of cancer metabolism, 2016
Denise Thiel, Imperial College London

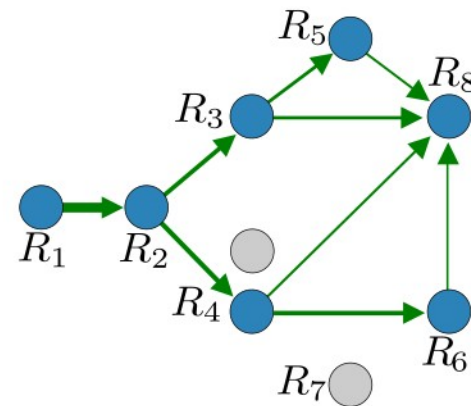
Mass Flow Graph

- Given stoichiometric matrix
- Construct reaction-based graph
- Weigh and analyse

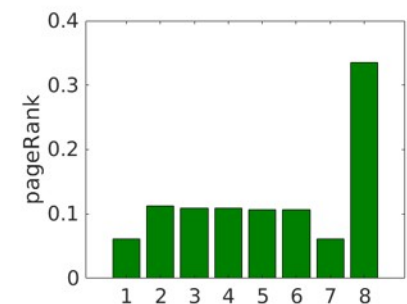
Model



Mass Flow Graphs



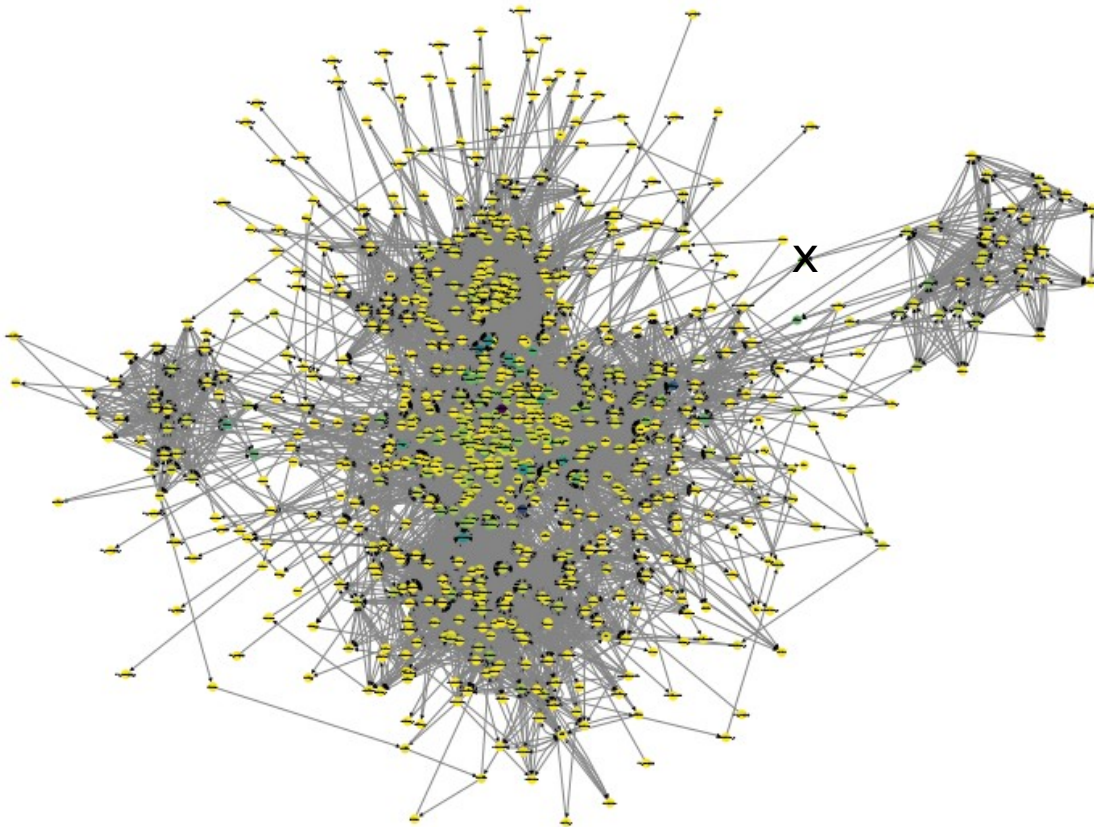
Centrality



* Beguerisse-Díaz et al, NPJ Sys Bio App, 2018

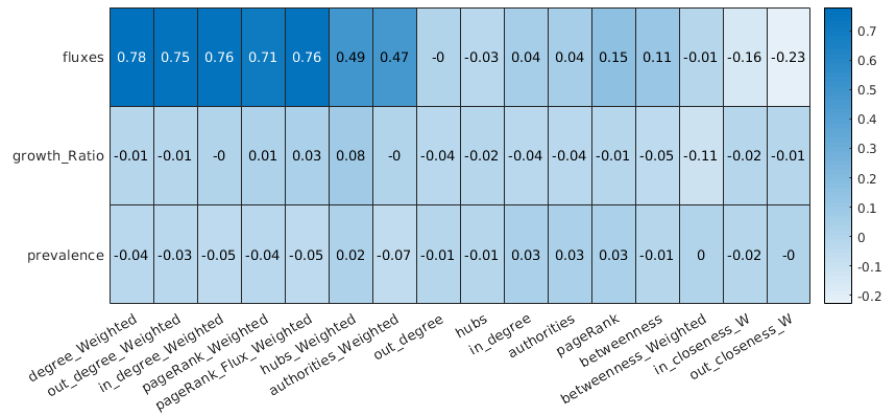
Network property → biological meaning?

Centrality-essentiality hypothesis

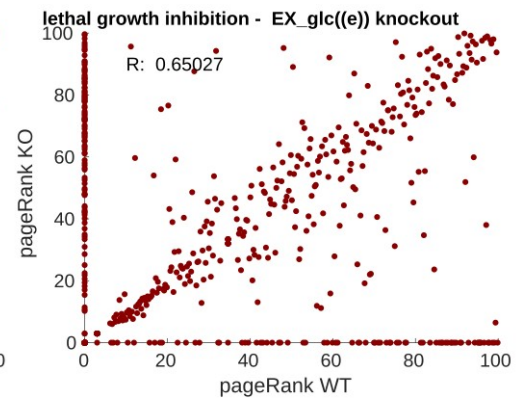
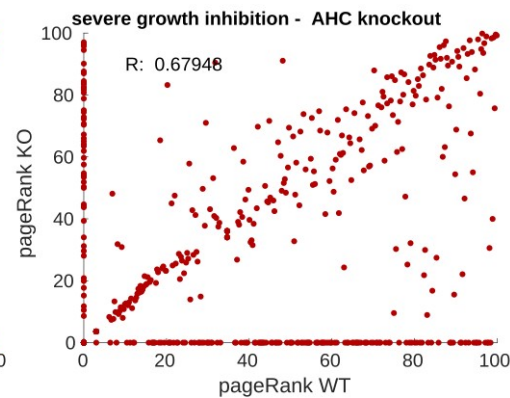
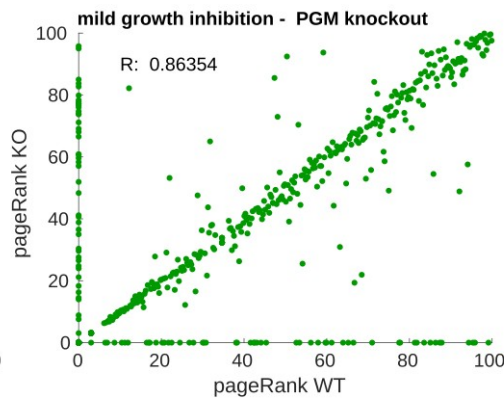
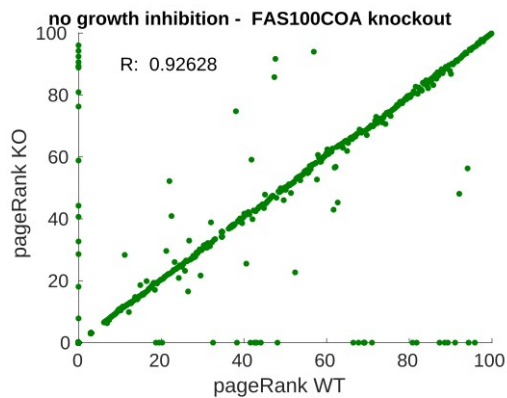


- **Examine degree, pageRank, ect.**
- **Compare with essentiality**
- **No correlation found**
- **Can MFGs help?**

Single reaction inhibition

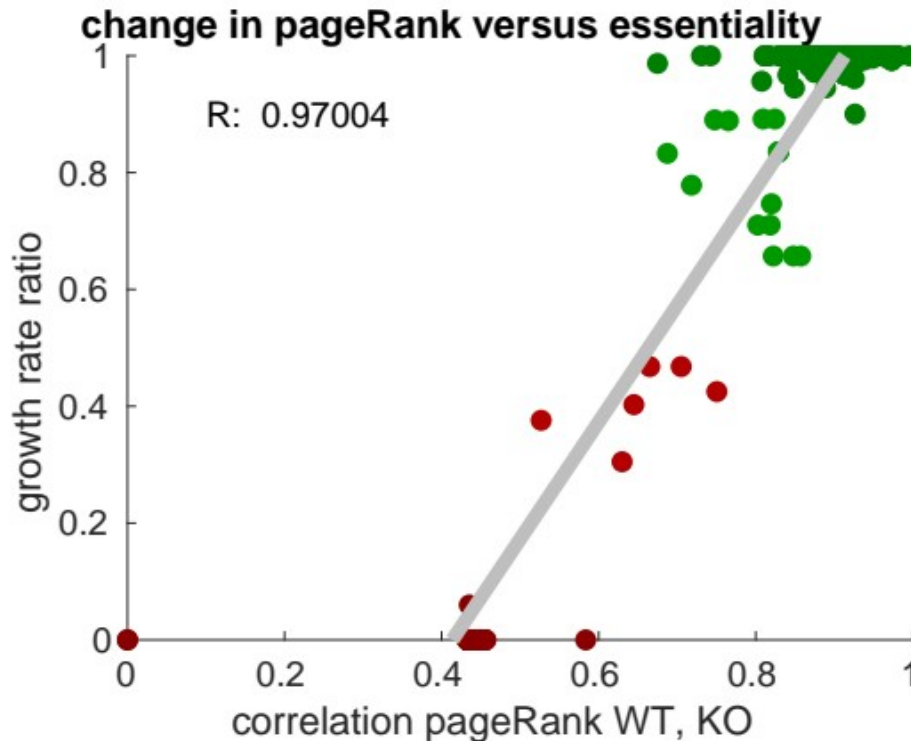


- Biomass production to assign essentiality
- Also not successful...
- Page rank



Hypothesis (almost) validated

- **Change in centrality correlates**
- **Can we replicate this without FBA?**



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ICL, Faculty of Natural Sciences,
Department of Mathematics

Imperial College
London

EPSRC

Engineering and Physical Sciences
Research Council



CANCER
RESEARCH
UK

