



QSB SEMINAR SERIES 291

Understanding the Role of Cellular Bioenergetics in Metabolism, Health, and Disease

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ABSTRACT

A major question in metabolic biochemistry is the role of cellular ATP production in energy homeostasis. We have approached this question through the quantitative analysis of ATP turnover in cultured cell models, using simultaneous measurement of extracellular fluxes that are proportional to the rates of the two major ATP-generating pathways in intact cells, glycolysis and oxidative phosphorylation. Using this approach, we propose a model for how a cell flexibly and rapidly adapts to changing substrate supply by changing its rates of glycolytic and oxidative ATP production. We have applied these approaches to cancer metabolism and identified a new energetic phenotype in cancer cells that is associated with metastatic progression and chemotherapeutic resistance. Understanding how and why this occurs may lead to new therapeutic strategies for treating cancer and preventing or attenuating metastasis.

