Molecular Biology of the Cell, Sixth Edition
Chapter 2: Cell Chemistry and Bioenergetics
Journal Club

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Paper

Matoba S, Kang JG, Patino WD et al. (2006) p53 regulates mitochondrial respiration. *Science* 312, 1650–1653.

Readings from *Molecular Biology of the Cell* (pp. 73–76, 84–85)

- How Cells Obtain Energy from Food
- Glycolysis is a Central ATP-Producing Pathway
- Fermentations Produce ATP in the Absence of Oxygen
- Electron Transport Drives the Synthesis of the Majority of the ATP in Most Cells

- The Warburg Effect is also discussed in the section *Cancer Cells Have an Altered Sugar Metabolism*, pp. 1098–1099

Relevant Techniques

- Quantitative RT-PCR (pp. 502–503)
- Western blot (pp. 452–455)

Questions

1. What process typically provides the main source of ATP in a eukaryotic cell? How are cancer cells different?

2. What motivated the authors to investigate a link between p53 and the Warburg effect?

3. What correlation did the authors find between the levels of p53 and the mechanism of ATP production?

4. They also measured the endurance of wild-type and p53 homozygous mutant mice. What did they observe? Is this consistent with the change they saw in the mechanism of ATP production?

5. What hypothesis did the authors test to explain the mechanism by which p53 deficiency decreases the rate of aerobic respiration? How do they come to this conclusion?

6. What is a luciferase reporter, and how did they use it in Figure 2B? What are the advantages and disadvantages of this type of analysis?

7. What additional pieces of data strengthen their model that p53 is regulating the switch from aerobic respiration to glycolysis via SCO2? Can you think of an additional experiment that would strengthen this study?

8. What makes this study and their findings so interesting?