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Phosphorylation of Metabolic Enzymes and Upstream Regulators

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Introduction

Cell biology is a branch of biology that studies the structure, function and behavior of cells. Cell biology encompasses both prokaryotic and eukaryotic cells and can be divided into many sub-topics which may include the study of cell metabolism, cell communication, cell cycle, biochemistry, and cell composition. The study of cells is performed using several techniques such as cell culture, various types of microscopy, and cell fractionation. Among biological entities, cells are regarded as of special importance since they are widely viewed as the simplest organized systems that are unambiguously alive. Although one can debate about entities such as viruses, there is little debate that cells are living. Cells perform all the activities critical to life, from metabolism to reproduction. All cells alive today maintain themselves far from thermodynamic equilibrium with their environment and are part of a continuous lineage of cell division that goes back approximately 4 billion years. The study of cells has required developing means of materially manipulating them and our contemporary understanding of cellular phenomena integrates results from a wide range of material interventions. The examination of cell biology, in turn, is a potent nexus for productive interactions between philosophers, historians, and social scientists, each of whom raises questions about the study of cells relevant to the others. The cell cycle machinery regulates cancer metabolism primarily at the post-translational level, either through phosphorylation of metabolic enzymes or upstream regulators by CDKs or through ubiquitination of these proteins by APC/C or SCF E3 ligases. Cellular organelles such as mitochondria, endoplasmic reticulum, Golgi apparatus, nucleus, microtubule-organizing center, and even the pathogen surface, act as platforms for trafficking and assembly of inflammasome complexes.

Cell biology is a branch of biology focused on the study of cell structure and function, on how cells form and divide, and how they differentiate and specialize. Cell biology defines both the general properties, common to most cell types, and also dissects the unique features of specialized cells, which allow them to perform different functions. This section of the Reference Module in Life Sciences includes a variety of articles that span from the molecular components of the cells to the most specialized functions. We treat carbohydrates, proteins lipids and nucleic acids and the molecular aspects underlying their role in both cell structure and functions. Cell biology studies have provided a wealth of information detailing the molecular and cellular regulation of adipocyte metabolism and adaptation to extracellular stimuli. Over the next few years, we are likely to learn more about the molecular switches controlling adipocyte differentiation/transdifferentiation and the metabolic and endocrine properties of brown/beige adipocytes. Studies in humans have failed to keep pace with the cell biology. While much is known regarding lipid metabolism at rest and during exercise, the hormonal regulators of these processes, and the effects of exercise training on metabolic fluxes, other important adipocyte-related questions remain unanswered in the fields of exercise metabolism and developmental biology. Future studies will need to decipher the cellular and molecular regulation of metabolism in adipocytes per se, without the confounding effects of contaminating immune, endothelial, stem, and progenitor cells contained within the adipose tissue. Cell biology is the study of the composition, organization and function of cells, of which all living matter is composed. The unicellular organisms made up mostly of prokaryotes (bacteria and archaea) are architecturally distinguishable from the eukaryotes in that they lack membrane bound organelles, which in turn gives rise to many distinguishing functions. Nevertheless, all cells are composed of the same general building blocks, and all are able to generate and use energy rich compounds, to reproduce themselves and to sense and respond to their environment. The diversity in cell structure and activity that has accompanied evolution provides a rich tapestry for understanding these basic units of life.