

Summary of Lec 17

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structure dictates function

1 Regulation in metabolic pathways

At the cellular level, the metabolome is generally maintained at a steady state. Whenever there is an alteration in the level of any metabolites, many regulatory mechanisms come together to reinvent the steady state of the cell by modulating the enzyme activity either by change in their concentration or allosteric modulation.

For example, the relative level of ATP and AMP is crucial to the existence of an organism. Whenever there is a decline in the ATP level and increase in the AMP level, there is a congruous increase in the activity of AMPK which enhances the rate of energy synthesis pathways and suppresses the energy-consuming biosynthesis pathways.

Other pathways of metabolic regulation include translation at the genome level, compartmentalization of enzyme and substrate at different locations and many more.

2 Isoenzyme

Isoenzyme, in simple terms, are different forms of the same enzyme catalysing the same reaction at different locations. The different forms of the enzyme generally differ in kinetic or regulatory properties, in the cofactor they use, or in their subcellular distribution (soluble or membrane-bound).

The relative level of various isoforms can sometimes be used to predict the status of various tissues where these isoenzymes perform. In general, the distribution of different isoenzymes of a given enzyme reflects different metabolic patterns in different tissues, different location and metabolic roles for isozymes in the same cell, stages of fetal development and their responses to allosteric modulators.