

Compartmentalization in cardiomyocytes modulates kinase activities

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Intracellular molecules are transported by motor proteins or diffusion. Whereas the former is targeted, the latter is the result of random molecular motion. For molecules existing in low concentrations, confinement of their diffusional space is a way the cells can regulate their signals to make them more rapid and targeted. Such confined spaces form compartments in which local concentrations are different from the overall, average concentrations. Calcium and cyclic AMP are well-known examples of compartmentalized molecules. Energetic compartmentalization means that in some compartments, the ratios of AMP and ADP to ATP are different from the average ratios. This modulates the activity of kinases, which are enzymes catalysing the transfer of a phosphate group typically from ATP or GTP to a specific substrate. Kinases are important in metabolism and signalling. A recent study demonstrated that energetic compartmentalization modulates the activity of creatine kinase and adenylate kinase *in situ*. This suggests that the diffusional space around these kinases is restricted. It highlights the importance of developing new methods to assess local concentrations and taking compartmentalization into account when interpreting experimental results.