THE ASSOCIATION OF GLYCOLYTIC ENZYMES WITH CELLULAR AND MODEL MEMBRANES

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Our lecture deals with two related topics. First, the association of glycolytic enzymes with the membranous or protein structural components of the cell, and second, with model membranes regarding the possible role of such association in the regulation of glycolysis.

It is currently generally accepted that the glycolytic enzymes, traditionally considered to be soluble, typical cytosolic proteins, work in some organization. This organization undoubtedly plays a significant role in the regulation processes of the glycolytic pathway. We review and discuss the most representative studies of the last two decades containing evidence and information on the circumstances in which binding occurs \textit{in vitro}. This binding is mainly controlled by ionic bonds and is not highly specific. In some cases integral membrane proteins have been indicated to be efficient adsorptive systems for the enzymes \textit{in vitro}.

We believe that the charged surface of a membrane phospholipid domain can provide similar interaction potential, as well as a binding site for the enzymes. In numerous \textit{in vitro} studies, including ours, the functional binding of aldolase, glyceraldehyde-3-phosphate dehydrogenase, lactate dehydrogenase, and pyruvate kinase to acidic phospholipid bilayers has been shown. Similarly to the interaction with natural membrane preparations, the interaction with lipid bilayers is sensitive to agents which modify ionic bonds. Such circumstances result in the alteration of the kinetic properties of the enzyme. As a representative example, we present studies on the binding of lactate dehydrogenase to bilayers made of various phospholipids, and the effects of this binding on the kinetic and molecular properties of the enzyme. The possible molecular mechanisms of enzyme activity modification are theoretically analyzed, and some experimental attempts to solve the mechanism in this case are presented.