

STUDYING OF LECTIN–CARBOHYDRATE INTERACTION

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Lectins function as carbohydrate recognition molecules in cell–molecule and cell–cell interactions in a variety of biological processes, such as cell adhesion and migration, phagocytosis, cell activation and differentiation, and apoptosis. Moreover, lectins which selectively recognize and bind carbohydrate moieties are widely used for development of biological assays and drug delivery systems. Hence, the interest in lectin–carbohydrate interactions is increasing considerably.

Biochemical studies showed that the lectin–carbohydrate interaction is specific and very often it is associated with metal ions such as calcium, magnesium and manganese [1]. Different physical techniques such as surface plasmon resonance (SPR), fluorescence polarization (FP), fluorescence correlation spectroscopy (FCS), micropipette method, and recently, atomic force microscopy in its force spectroscopy mode, have been applied to study the kinetic properties of the lectin–carbohydrate binding [2–5].

In the present work, the AFM, quartz crystal microbalance (QCM) and fluorescence microscopy were used to characterize the binding occurring during recognition of the mannose residues (bearing by carboxypeptidase Y, CaY) by two lectins: concanavalin A (Con A from *Canavalia ensiformis*) and lentil lectin (*Lens culinaris agglutinin*). The applied methods showed the specific interaction of both lectins with carboxypeptidase Y and the necessity of calcium and manganese ions for the binding process. The control measurements were carried out using bovine serum albumin (BSA) protein which demonstrated no affinity toward glycoprotein. For binding process between Con A and mannose residue of CaY the association equilibrium constant was obtained using QCM technique. The force spectroscopy measurement of the unbinding forces between Con A and CaY as a function of loading rate was used to characterize the bond dissociation.

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