Public Abstract

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Title: Kinase-interacting FHA domain of kinase associated protein phosphatase: Phosphopeptide interactions and NMR-detected dynamics

FHA domains are phosphoprotein binding modules found in diverse signaling proteins. Kinase-associated protein phosphatase (KAPP) from Arabidopsis employs its FHA domain (KI-FHA) in its negative regulation of some receptor-like kinase (RLK) signaling pathways important in plant development and environmental response. The interactions between KI-FHA of KAPP and RLK kinase domains have been investigated by multiple biophysical and biochemical methods. Thr546 in the C-lobe of BAK1 kinase domain has been identified by mutagenesis to be a principal binding site of KI-FHA. The first NMR detection of an FHA domain binding to an intact globular protein domain suggests BRI1 kinase domain interacts with the same sites of KI-FHA as do phosphoThr peptides. The backbone mobility of KI-FHA, free and bound to pThr868CLV1 peptide, has also been investigated using ^{15}N NMR relaxations. This is the first backbone dynamic study of a FHA domain and a FHA in complex with its phospholigand. Binding of the CLV1 pThr peptide seems to globally reduce nsec-scale fluctuations of KI-FHA. Besides residues on the ligand binding site of KI-FHA, peptide binding also rigidifies residues at the remote sites across the β-sandwich. Linkage between the backbone dynamics and binding thermodynamics has been discussed.