Abstract

A two-component system, consisting of a histidine kinase and a response regulator, is a crucial molecular-biology tool for many bacteria to react to an environmental changes. An important step in activation of the two-component system is an autophosphorylation reaction on the dimeric histidine kinase, which involves the transfer of a phosphate group from ATP in the catalytic domain to a conserved histidine molecule. Depending on whether the transfer of the phosphate group occurs within one subunit of the dimer or from one subunit to another, we distinguish a *cis*- or *trans*-autophosphorylation, respectively. Here we study the autophosphorylation reaction of globin coupled histidine kinase from soil bacteria *Anaeromyxobacter sp*. Fw109-5 (*Af*GcHK), which uses heme to detect gaseous molecules. Using a phosphorylation analysis of a heterodimer of *Af*GcHK composed of a subunit with a defective ATP-binding site and a subunit with a phosphorylatable histidine substituted for alanine, the *trans*-mechanism of autophosphorylation was identified for *Af*GcHK.

Key words: two component signal systems, histidine kinase, heme-containing oxygen sensors, Phos-tag, *Af*GcHK

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