VIP1 encodes one of two yeast inositol pyrophosphate synthases; the other is encoded by KCS1. The inositol pyrophosphatesproduced by Kcs1p and/or Vip1p serve as high-energy signaling molecules involved in such diverse processes as vacuolar biogenesis, the stress response, DNA repair, cell wall synthesis, telomere maintenance, and phosphate homeostasis.Both enzymes catalyze the addition of beta-phosphate to the fully phosphorylated six-carbon ring of inositol hexakisphosphate. However, these enzymes produce different isomers of diphosphoinositol pentakisphosphate. Kcs1p phosphorylates IP6 at the C5 position forming 5PP-IP5, and Vip1p phosphorylates IP6 at the C4 or C6 position forming 4PP-IP5 or 6PP-IP5, respectively. The different IP7 isomers are biologically relevant: the Kcs1p product cannot substitute for the Vip1p product during phosphate homeostasis. Kcs1p and Vip1p also work in concert to produce bis-diphosphoinositol tetrakisphosphate. Kcs1p phosphorylates the Vip1p IP7 product 4/6PP-IP5, and Vip1p phosphorylates the Kcs1p IP7 product 5PP-IP5.Inositol pyrophosphate synthases are highly conserved and found across eukaryotes. In humans, three Kcs1p-like enzymesand two Vip1p-like enzymeshave been identified.