MCK1 encodes a dual-specificity protein kinase related to mammalian glycogen synthase kinases in the GSK-3 family. Mammalian GSK-3 kinases are involved in signal transduction and in regulating glycogen metabolism, gene expression, development, and cell differentiation. The phenotypes of mck1 mutants and of overexpressing wild type MCK1 suggest that Mck1p plays roles in chromosome segregation and in regulating entry into meiosis. Cells lacking MCK1 are viable but cold sensitive, and show increased mitotic chromosome loss at semipermissive temperatures or in the presence of the microtubule destabilizing drug benomyl. MCK1 shows genetic interactions with the centromeric sequence element CDEIII, and with CBF2 and CBF5, which encode centromere binding proteins. Mck1p phosphorylates Cbf2pand interacts physically with Cbf2p and Cbf5p in vivo. In diploids, mck1 mutations cause delayed and decreased levels of sporulation and defects in ascus formation. MCK1 interacts genetically with IME1, which encodes a sporulation-specific transcriptional activator. The protein phosphatase Yvh1p may act upstream of Mck1p in regulating sporulation. Mck1p autophosphorylates on tyrosine and serine residues; the tyrosine phosphorylation is elevated during sporulation in strains lacking the protein tyrosine phosphatases Ptp2p and Ptp3p. Mck1p may also be involved in regulating intermediary metabolism; MCK1 interacts genetically with CDC19, which encodes pyruvate kinase. Purified Mck1p interacts physically with pyruvate kinase in vitro, and may regulate pyruvate kinase activity by direct phosphorylation. Three other protein kinases of the GSK-3 family have been identified in yeast; they are encoded by RIM11/MDS1, YGK3, and MRK1. Related kinases have also been found in Drosophila, Arabidopsis, and Kluyveromyces lactis as well as mammals. Note: MCK1, YPK1/YKL126W, which encodes a ser/thr protein kinase and TOK1/YJL093C, which encodes a potassium channel have been refered to as YPK1 in the literature.