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A mitochondrial homolog of bacterial GrpE interacts with mitochondrial hsp70 and is essential for viability

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Mitochondrial hsp70 (mhsp70) is located in the matrix and an essential component of the mitochondrial protein import system. To study the function of mhsp70 and to identify possible partner proteins we constructed a yeast strain in which all mhsp70 molecules carry a C-terminal hexa-histidine tag. The tagged mhsp70 appears to be functional in vivo. When an ATP depleted mitochondrial extract was incubated with a nickel-derivatized affinity resin, the resin bound not only mhsp70, but also a 23 kDa protein. This protein was dissociated from mhsp70 by ATP. ADP and GTP were much less effective in promoting dissociation whereas CTP and TTP were inactive. We cloned the gene encoding the 23 kDa protein. This gene, termed GRPE, encodes a 228 residue protein, whose sequence closely resembles that of the bacterial GrpE protein. Microsequencing the purified 23 kDa protein established it as the product of the yeast GRPE gene. Yeast GrpEp is made as a precursor that is cleaved upon import into isolated mitochondria. GrpEp is essential for viability. We suggest that this protein interacts with mhsp70 in a manner analogous to that of GrpE with DnaK of E.coli.

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