{\it CSE1}, an essential yeast gene required for cell cycle progression, encodes a nuclear transport factor

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Abstract

CSE1, an essential Saccharomyces cerevisiae gene was initially isolated in a screen for genes important for accurate chromosome segregation. cse1 mutants have pleiotropic phenotypes including defects in the ubiquitin-mediated degradation of mitotic cyclins and in cell cycle progression. SRP1, encodes a nuclear localization signal (NLS) receptor protein involved in nuclear protein import that is an allele specific dosage suppressor of cse1-1. CSE1 can rescue certain srp1 mutant phenotypes, indicating that Cse1p and Srp1p are functionally related or have roles in similar pathways.^ New mutant alleles of CSE1 were generated by linker insertion mutagenesis, including a temperature sensitive allele, cse1-2, that causes arrest in G2/M, chromosome missegregation and defective mitotic cyclin degradation. Analysis of CSE1 mRNA and Cse1p indicate that their levels do not change significantly during the cell cycle and that Cse1p is not phosphorylated. Cse1p is located in the nucleus and concentrated at the nuclear periphery, probably in association with nuclear pores.^ Current evidence supports the model that Cse1p is required for the export of Srp1p from the nucleus. Srp1p improperly accumulates in the nuclei of both cse1-1 and cse1-2 cells. Reporter proteins that contain NLS sequences accumulate in the cytoplasm of cse1-1 and cse1-2 cells indicating that Cse1p function is also necessary for nuclear protein import. Cse1p binds the nuclear transport protein Ran/Gsp1p-GTP via a conserved amino-terminal motif. In addition, the human protein CAS, which is an export factor for importin-$\alpha,$ is 60% similar to Cse1p.^ Although a physical interaction between Srp1p and Cse1p has not been shown, a two-hybrid screen identified two potential Cse1p-interacting proteins, Scj1p and Yma5p. Scj1p is a DnaJ homologue involved in protein translocation, folding, and complex assembly. Yma5p is a novel non-essential protein with an as yet unknown role in these important nuclear processes. ^

Subject Area

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