In S.cerevisiae, two genes encode alpha-tubulin: TUB1 and TUB3. Tub1p belongs to the tubulin superfamily, which includes beta- and gamma-tubulin and the prokaryotic tubulin-like gene FtsZ. Alpha- and beta-tubulin form tubulin heterodimers, which polymerize into microtubules. Microtubules are conserved cytoskeletal elements that function in nuclear processes: chromosome segregation in mitosis and meiosis, spindle orientation, and nuclear migration during mitosis and mating. All microtubules in S.cerevisiae emanate from a microtubule organizing center called the spindle pole body, which is embedded in the nuclear envelope. Microtubules extend from both faces of the SPB, generating two types of microtubules: nuclear and cytoplasmic microtubules. The distribution and length of these two types of microtubules is regulated throughout the cell cycle. TUB1 and TUB3 were cloned based on their strong homology with their counterparts in other eukaryotes. TUB1 is essential and more highly expressed than TUB3. TUB1 and TUB3 are functionally equivalent; consequently, TUB3 overexpression can suppress the lethality of a tub1 null mutation. However, in vitro experiments suggest functional differences since microtubules purified from cells that contain only Tub1p are more dynamic than those that contain only Tub3p, displaying elevated rates of shrinkage and catastrophe. There is an abundance of tub1 conditional mutants resulting from genetic screens for chromosome loss and sensitivity or resistance to anti-microtubule drugs, suppressor analysis, as well as in vitro mutagenesis. Almost all conditional tub1 mutants are cold sensitive, presumably reflecting the intrinsic cold sensitivity of the microtubule polymer. Tub1p interacts with numerous proteins involved in the regulation of microtubules, such as microtubule motors, SPB components, kinetochore components, tubulin biogenesis factors, and beta-tubulin. Tub1p is a GTP-binding protein, though the GTP bound to Tub1pis non-hydrolyzable, whereas the GTP bound to Tub2p is hydrolyzed following tubulin dimer addition to the microtubule end. The structure of tubulin has been crystallized in the polymerized state; Tub1p, rather than Tub2p, is believed to interact directly with the SPB.