In S.cerevisiae, two genes encode alpha-tubulin: TUB1 and TUB3. Tub3p 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. Distribution and length of these two types of microtubules is regulated throughout the cell cycle 10,. TUB1 and TUB3 were cloned based on strong homology with their counterparts in other eukaryotes. It is not clear why S. cerevisiae has two functionally identical genes for alpha-tubulin, but this arrangement may have some significance since it is conserved in the fission yeast, S. pombe. However, in vitro experiments suggest there are functional differences, as microtubules containing Tub3p as the sole alpha tubulin are less dynamic than wild-type microtubuleswhile those containing Tub1p are more dynamic than wild-type. Relative to TUB1, TUB3 is expressed at low levels and is not essential for growth. Further, overexpression of TUB3 can suppress the lethality of a tub1 null mutation. tub3 null mutants grow normally under most conditions but are benomyl-and cold-sensitive. Tub3p interacts with numerous proteins involved in the regulation of microtubules, such as microtubule motors, SPB components, kinetochore components, tubulin biogenesis factors, and beta-tubulin. Tub3p is a GTP-binding protein, though the GTP bound to Tub3pis 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; Tub3p, rather than Tub2p, is believed to interact directly with the SPB.