The Aurora kinase complexis an essential regulator of chromosome segregation, spindle checkpoint, and cytokinesis. The four members of the Aurora kinase complex are conserved from yeast to man. Ipl1p/Aurora B, a Ser/Thr protein kinase, is the enzymatic component of the complex. The other three complex members, Sli15p/INCENP, Bir1p/Survivinand Nbl1p/Borealin, are all essential genes in S. cerevisiae and are thought to play roles in Ipl1p localization, stabilization and/or regulation. Bir1p contains three baculovirus IAP repeat domains, a protein motif which is usually found in inhibitor-of-apoptosis proteins, and Bir1p appears to play independent roles in chromosome stability and apoptosis.In S. cerevisiae, Ipl1p function is specifically required at many distinct locations and events during cell division. Ipl1p localizes to kinetochores from G1 to metaphase and to the spindle after metaphase. During chromosome segregation, Aurora kinase ensures chromosome bi-orientation by promoting turnover of connections between kinetochores and spindle pole bodies until the movement of sister kinetochores toward opposite spindle poles creates tension. If tension defects arise, Aurora kinase activity creates unattached kinetochores and activates the spindle assembly checkpoint. Ipl1p relocalizes to the spindle midzone in late anaphase, where it ensures that cytokinesis completes only after all chromosomes have migrated to the poles. Ipl1p is also required for mitotic spindle disassembly, and during this process Ipl1p localizes to the plus ends of the depolymerizing spindle microtubules. The dynamic localization of the Aurora kinase complex is a carefully regulated process. For example, it has been demonstrated that movement of the complex from the kinetochores to the spindle is regulated by dephosphorylation of a non-catalytic member of the Aurora kinase complex, Sli15p, by Cdc14p. The primary regulator of Aurora Kinase activity, type 1 protein phosphastase Glc7p, acts in opposition to Aurora kinase by dephosphorylating Ipl1p targets, rather than by directly regulating Ipl1p. Demonstrated Ipl1p phosphorylation targets include: kinetochore components Cbf2p, Mif2p and Tid3p; proteins required for spindle assembly or integrity such as Ase1p, Mad3p and Dam1p; condensin; Histone H3; and Aurora Kinase complex component, Sli15p.There are three Aurora kinase family members in Homo sapiens:, which vary in function and tissue specificity. Aurora kinases have been implicated in tumorigenesis, and Aurora kinase expression levels and activity have been shown to be up-regulated in many human cancers.