The C-terminal domain kinase, a three-subunit complex comprised of Ctk1p, Ctk2p, and Ctk3p, has key roles in regulation of transcription and translation, and in coordination of the two processes. The complex regulates the C-terminal repeat domainof the largest subunit of RNA polymerase II, Rpo21p, via phosphorylation of the 2nd serine residue in the seven-amino acid repeat sequence that occurs multiple times within the domain. Variable phosphorylation of the Rpo21p CTD domain throughout the transcription cycle is mediated by several different kinases and phosphatases, and the differentially phosphorylated forms bind to other protein complexes important for transcription, chromatin remodeling, mRNA modification and processing, nuclear mRNA export, and other related processes. The CTDK-1 complex may also have a role in regulation of RNA polymerase I transcription: the complex is partially located in the nucleolus and physically interacts with RNA Pol I, and mutations in the complex subunits cause a decrease in efficiency of formation of initiation complexes at rRNA gene promoters as well as abnormal nucleolar morphology. In addition to its roles in the nucleus and nucleolus, the CTDK-1 complex associates with polysomes and phosphorylates the small ribosomal subunit protein Rps2p to regulate translational efficiency and accuracy. Ctk1p is the catalytic subunit of the CTDK-1 complex. Ctk1p is itself phosphorylated by Cak1p, which also phosphorylates other cyclin-dependent kinases, and phosphorylation is important for full Ctk1p activity. Two other subunits, the cyclin C-related Ctk2p and Ctk3p, are also essential for function. A screen for suppressors of human BRCA1-induced lethality in S. cerevisiae implicated CTDK-1 in a pathway for regulated RNA polymerase II degradation in response to DNA damage, which may have a role in the development of breast cancer.