Cell Cycle Studies on the Human Nek5 Protein Kinase and Characterization of its Protein Interaction Profile

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The human kinome and all its associated signaling proteins comprise an important network that is crucial for the regulation of the majority of cellular functions. The NIMA-related kinases (NEKs) are a family of serine/threonine kinases involved largely in cell cycle control in fungi, mammals and other eukaryotes. hNek5 is a new member of the human Nek family of yet unknown function. Analysis of RT-PCR products showed that hNek5 mRNA was expressed in asynchronous HeLa cells, but, the expression was strongly regulated during the cell cycle. HeLa cells were pre-synchronized by incubation with thymidine for 16 hours, released from the drug arrest for 4 hours, and treated with nocodazole to arrest cells in M-phase during 12 hours. Nek5 is undetectable during S and G2 and only becomes apparent as cells approach the M phase. In another line of research we are interested in obtaining novel insights into Nek5 function by identifying interacting proteins. A yeast two-hybrid screening was performed with a human universal cDNA library using the C-terminal regulatory region of hNek5 as a bait. A total of 17 plasmid DNAs from interaction positive clones were sequenced, and 7 different prey proteins were identified. According to GeneTools, the biological processes of the proteins identified in the screening were: apoptosis, mitochondrial transport, respiratory chain complex IV assembly and filament dynamics. These results suggest a role of hNek5 in processes related to mitochondria and filament dynamics, which are the first evidence of functions related to this protein.

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