Increase in the expression of the neuronal cyclin-dependent protein kinase cdk-5 during differentiation of N2A neuroblastoma cells

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Abstract

Cytoskeleton organization is sensitive to regulatory signals at both spatial and temporal levels. In differentiating neurons, regulation of cell architecture is specially relevant, and tau plays a major role in the outgrowth of neurites and axonal development. Tau activity in determining neuronal polarity is modulated by protein kinases including cdk5. A significant increase in the expression of cdk5 was observed in N2A neuroblastoma cells induced to differentiate in the presence of dibutyryl cAMP. This induction of cdk5 was concomitant with changes in the distribution of tau, and with an increase in the microtubule assembling activity of neuronal extracts of cells undergoing differentiation. The course of cdk5 expression with time followed a linear relationship within a 48 h period. These findings were corroborated by RT-PCR in which higher levels of the transcripts for cdk5 were detected in N2A cells with differentiated morphology, as compared with undifferentiated cells. Studies suggest that the role of tau in the sequence of molecular events leading to extension of neurites in neuroblastoma cells is mediated by selective phosphorylations by cdk5.