

Review Article

Regulation of brain-derived neurotrophic factor expression in neurons

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Abstract: Brain-derived neurotrophic factor (BDNF) plays critical roles in many aspects of brain functions, including cell survival, differentiation, development, learning and memory. Aberrant BDNF expression has also been implicated in numerous neurological disorders. Thus, significant effort has been made to understand how BDNF transcription as well as translation is regulated. Interestingly, the BDNF gene structure suggests that multiple promoters control its transcription, leading to the existence of distinct mRNA species. Further, the long- and short-tail of the 3' un-translated region may dictate different sub-cellular BDNF mRNA targeting and translational responses following neuronal stimulation. This review aims to summarize the main findings that demonstrate how neuronal activities specifically up-regulate the transcription and translation of unique BDNF transcripts. We also discuss some of the recent reports that emphasize the epigenetic regulation of BDNF transcription. (JPP1212001).

Keywords: Brain-derived neurotrophic factor, calcium-responsive element, cAMP-responsive element, intracellular signaling, neuroplasticity, transcription and translation

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