Novel Alternative Splicing Predicts a Truncated Isoform of the NMDA Receptor Subunit 1 (NR1) in Embryonic Rat Brain

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Abstract

The expression of mesencephalic brain derived neurotrophic factor (BDNF) has been shown to be regulated by dopaminergic neuronal functioning and glutamate receptors (GluRs). In turn, BDNF participates in the regulation of mesencephalic GluRs' expression. In the present study we analyzed, using semi-quantitative RT-PCR, the effect of BDNF as well as of the GluRs agonists NMDA and *trans*-(±)-1-Amino-(1S,3R)-cyclopentane dicarboxylic acid (t-ACPD), on the expression levels of the NMDA GluR subunit 1 (NR1) mRNA, using rat cultured mesencephalic neurons. In the course of this study, a novel rat mRNA splice variant of NR1 was identified. This new NR1 mRNA isoform is characterized by the insertion of an 82 base pair intron containing an inframe stop codon, thus predicting the expression of a putative truncated protein of 465 amino acids. The RT-PCR and *in situ* hybridization reveals that the novel NR1 mRNA is expressed in various brain regions of the rat embryo, whereas no expression was detected in the adult rat brain. The modulation of the novel NR1 mRNA isoform by both BDNF and the metabotropic GluR agonist t-ACPD, suggests that the resulting putative NR1 truncated protein may be relevant in the regulatory network of glutamatergic neurotransmission in the developing central nervous system.