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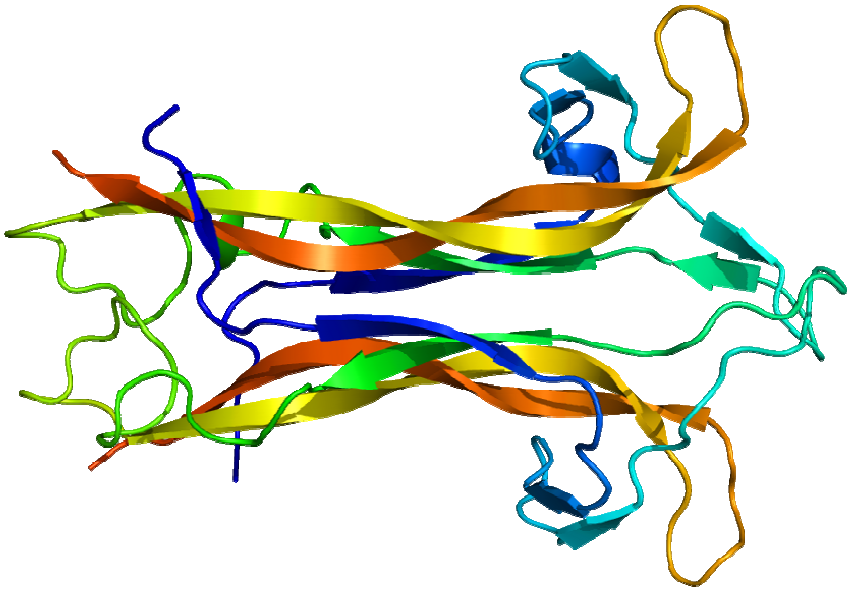
Federal Research Center Institute of Cytology and Genetics
Department of Behavioral Neurogenomics

Neurotrophic factors in the regulation of behavior

Vladimir S. Naumenko

Pharmacology-2015
Brisbane, Australia, 20-22 July 2015

Brain-derived neurotrophic factor (BDNF) is necessary for maintenance of adult serotonin neurons and involved in the mechanims of neurogenesis, apoptosis as well as depression, anxiety and aggression

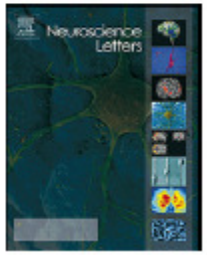


Neuroscience Letters 505 (2011) 82–86

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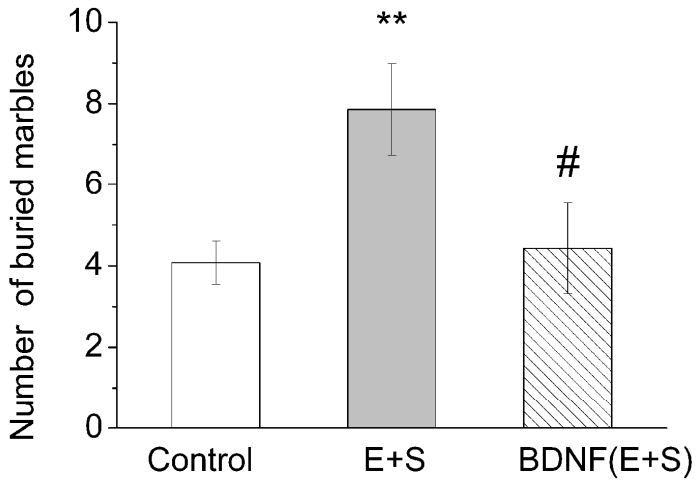


Ameliorative effect of BDNF on prenatal ethanol and stress exposure-induced behavioral disorders

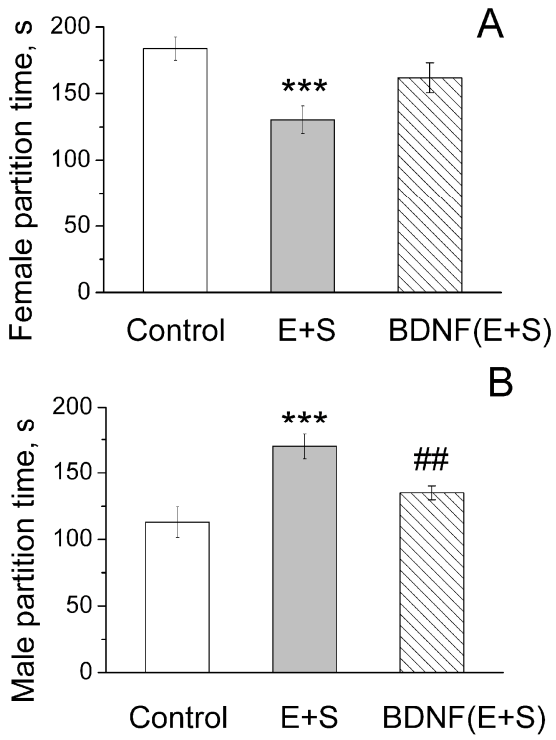
Nina K. Popova*, Maryana V. Morozova, Vladimir S. Naumenko

Department of Behavioral Neurogenomics, Institute of Cytology and Genetics, Siberian Division of the Russian Academy of Sciences, Lavrentyeva av. 10, 630090 Novosibirsk, Russia

Ameliorative effect of BDNF on prenatal ethanol and stress exposure-induced behavioral disorders

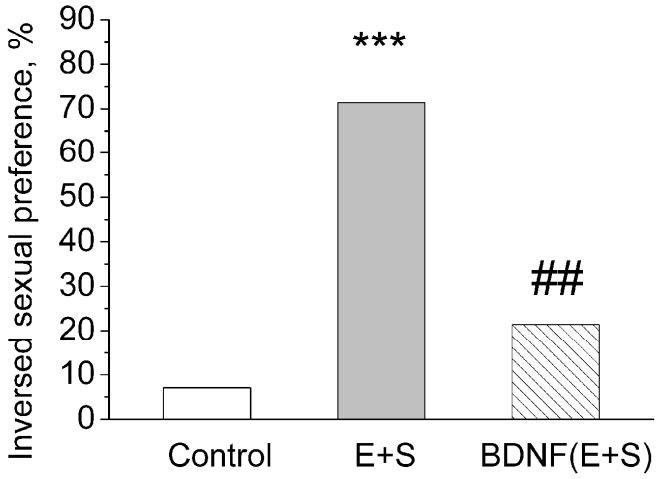


The number of buried marbles in control, E+S and BDNF (E+S) groups

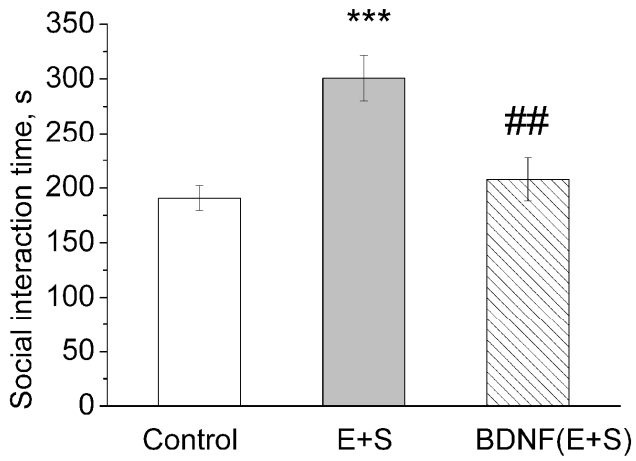


The time spent by a male mouse at the compartments with receptive female (A) or male mouse (B) in control, E+S and BDNF (E+S) groups

Popova et al., 2011 (Neursco Lett)

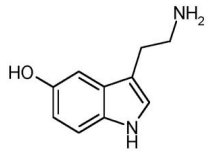


Percentage of male mice with inversed sexual preference in control, E+S and BDNF (E+S) groups



Social contacts with juvenile male in control, E+S and BDNF (E+S) groups

Popova et al., 2011 (Neursco Lett)



Serotonin

Serotonin helps regulate

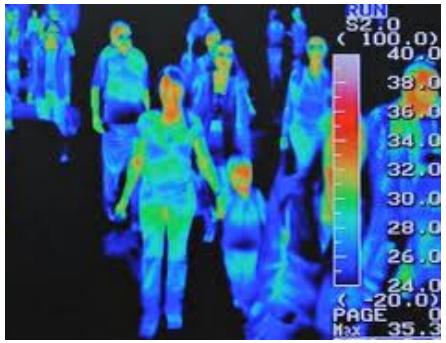
sleep



appetite



body temperature



mood



agression

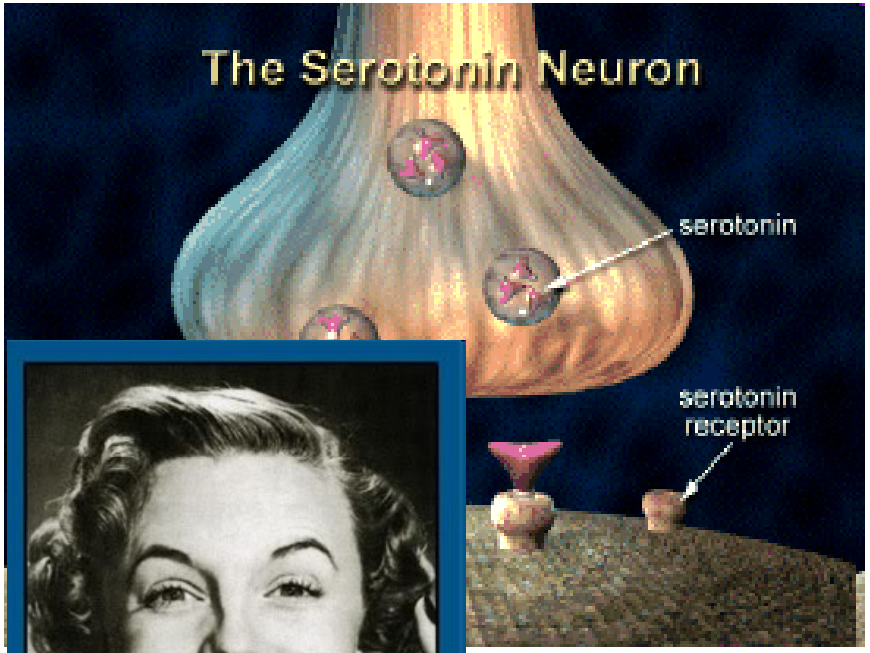


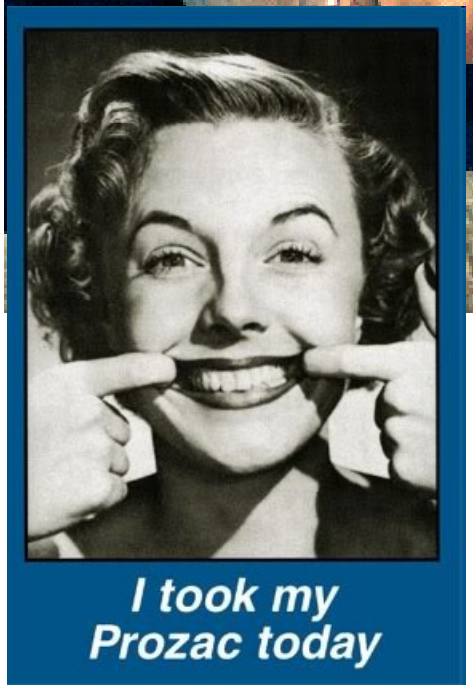
sexuality



Disbalance in serotonin system results in depression and anxiety







Neuroscience 214 (2012) 59–67

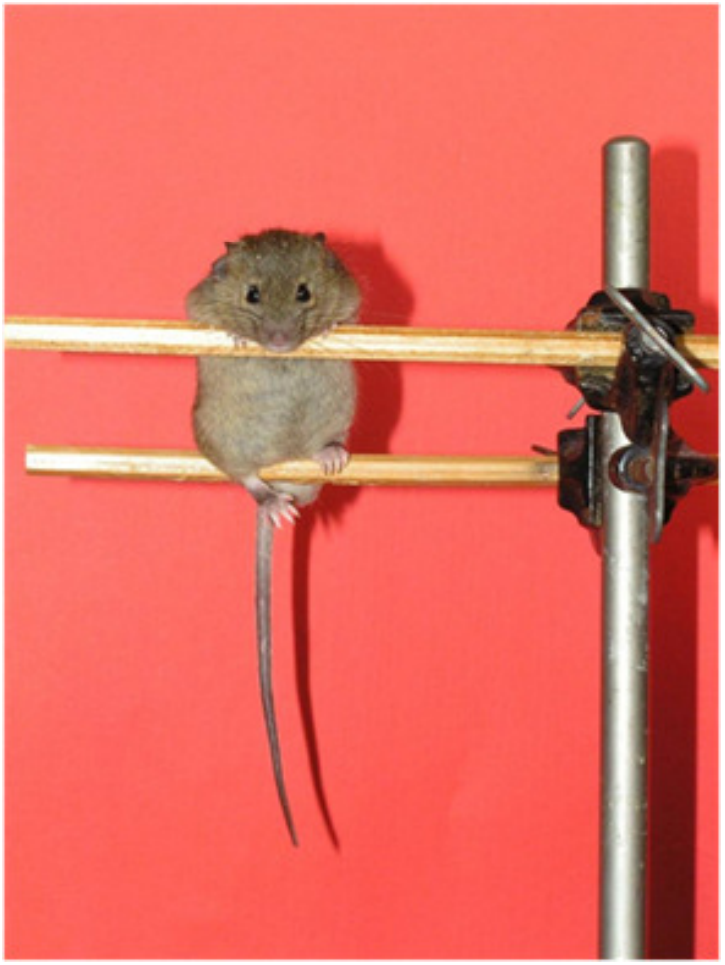
EFFECT OF BRAIN-DERIVED NEUROTROPHIC FACTOR ON BEHAVIOR AND KEY MEMBERS OF THE BRAIN SEROTONIN SYSTEM IN GENETICALLY PREDISPOSED TO BEHAVIORAL DISORDERS MOUSE STRAINS

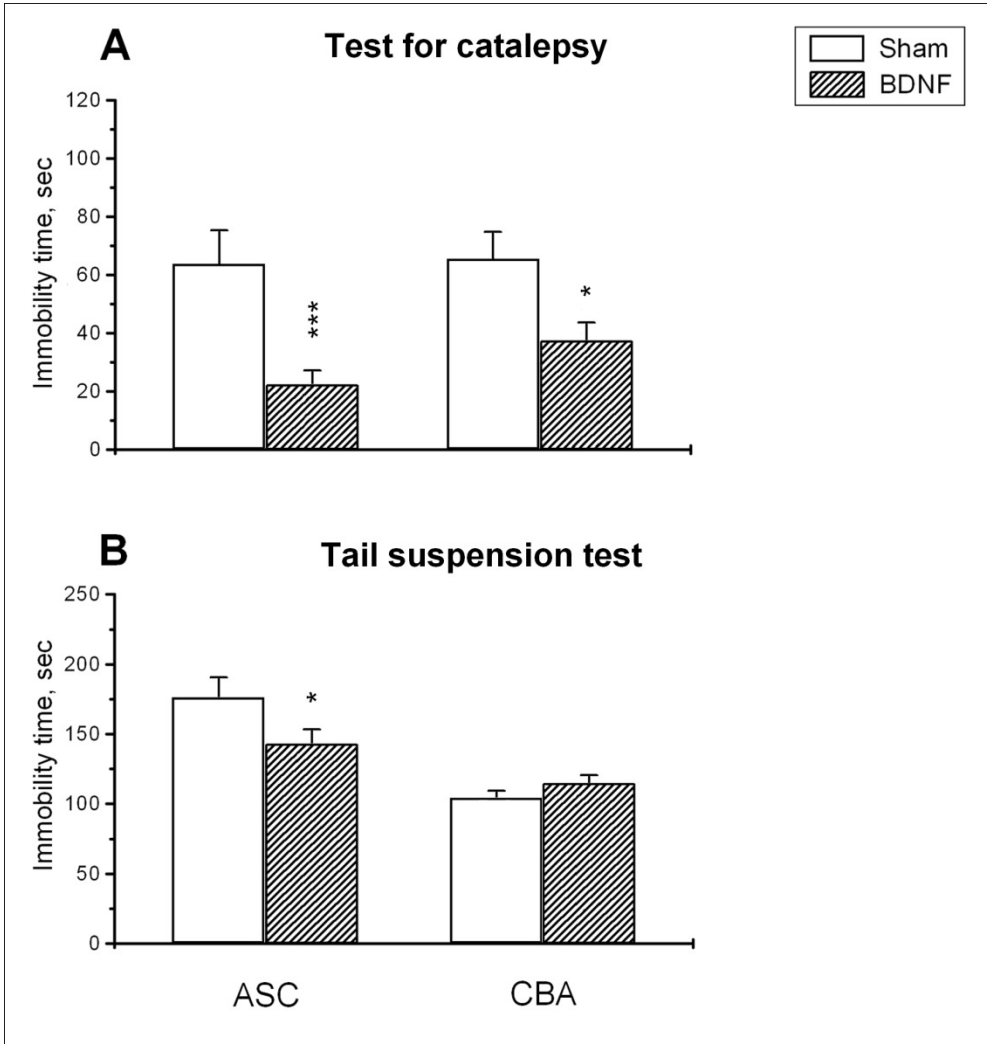
V. S. NAUMENKO,* E. M. KONDAUROVA
D. V. BAZOVKINA, A. S. TSYBKO, M. A. TIKHONOVA,
A. V. KULIKOV AND N. K. POPOVA

Department of Behavioral Neurogenetics, Institute of Cytology and Genetics, Siberian Division of the Russian Academy of Science, Novosibirsk, Russia

•ASC mice - a model of depressive-like behavior

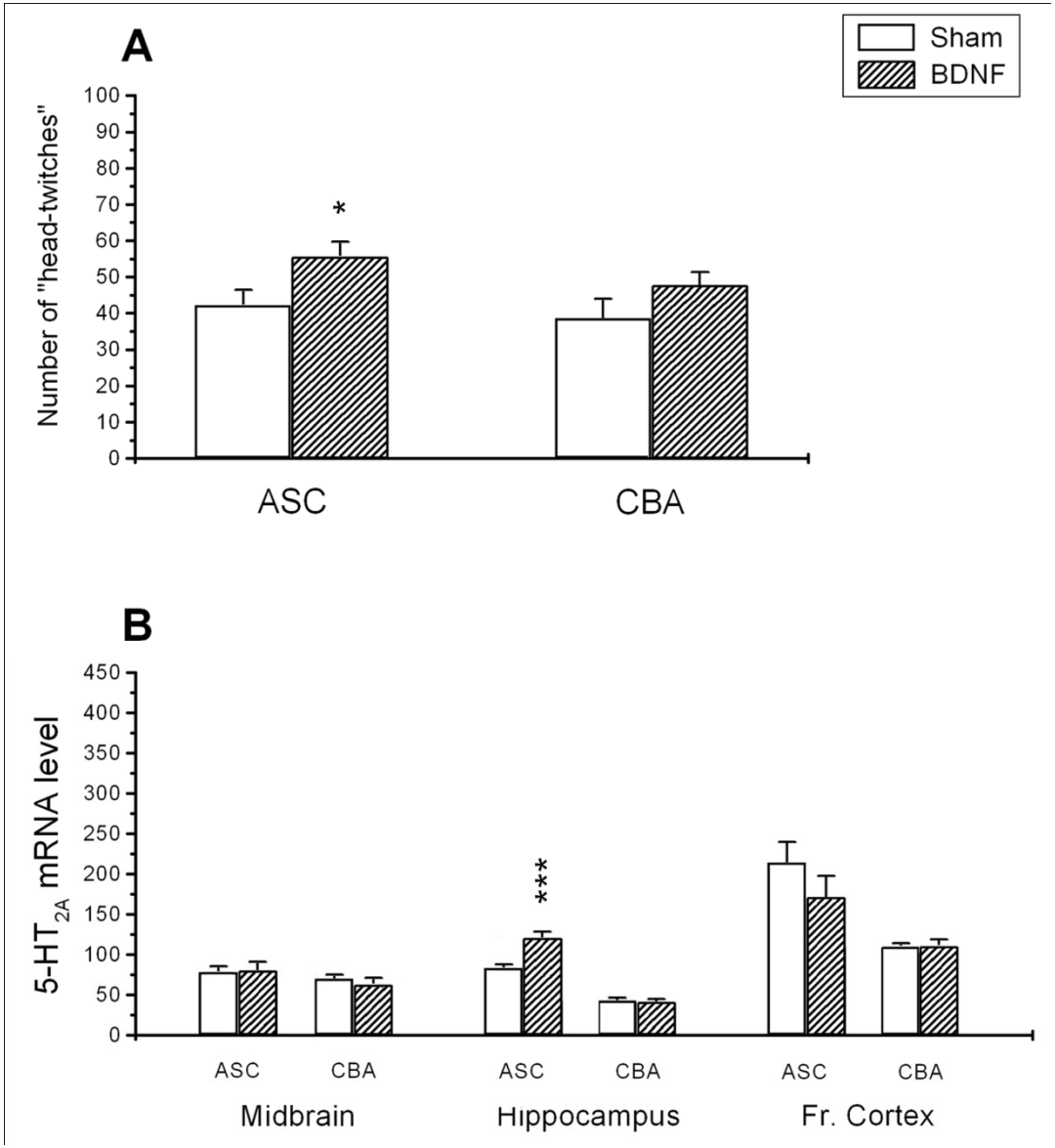
•CBA mice – cataleptic “nondepressive” mice





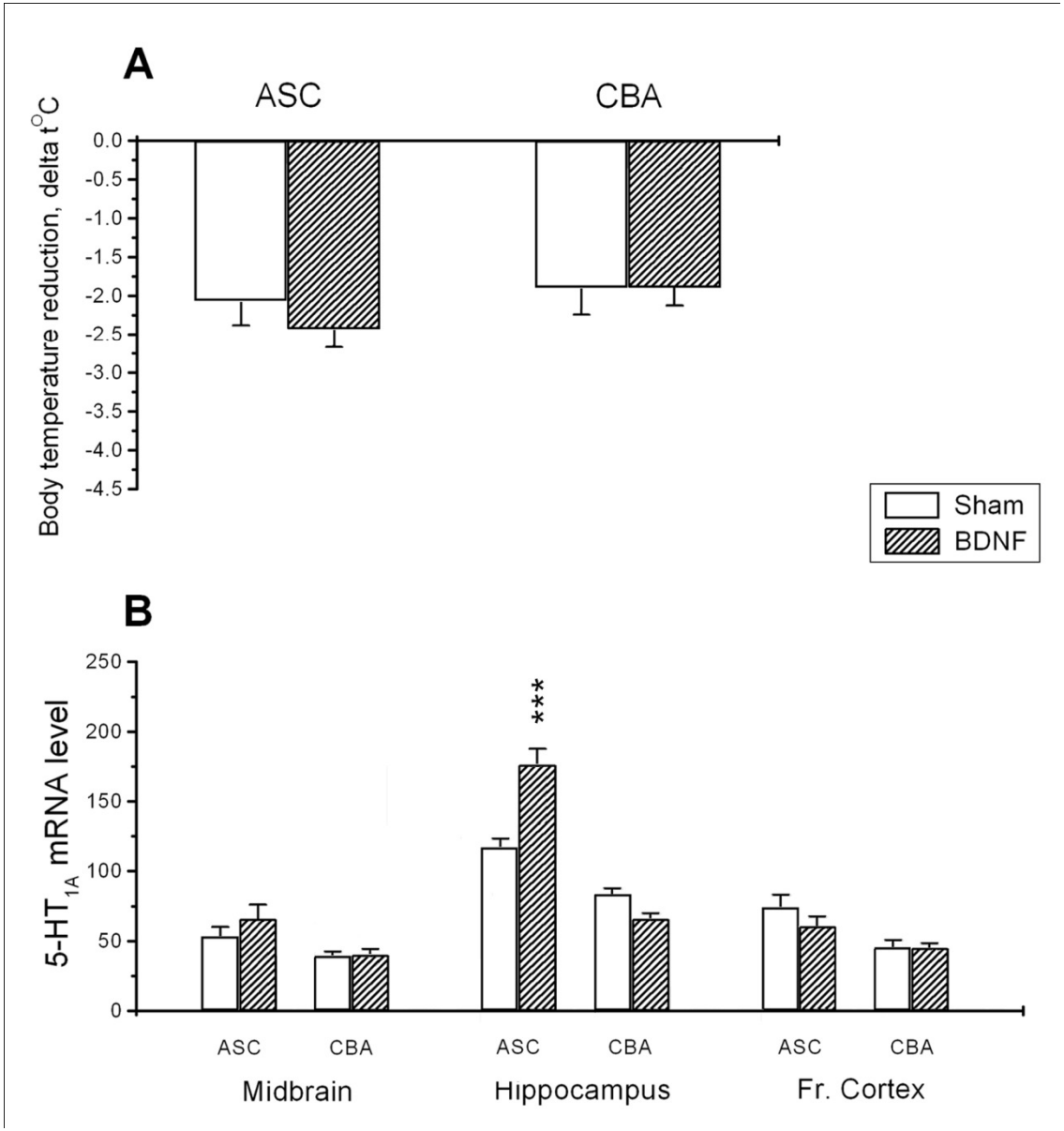
Immobility time estimated in the test for hereditary catalepsy (A) and in the TST (B) for ASC and CBA mice treated with BDNF and control mice

Naumenko et al., 2012 (Neursci)



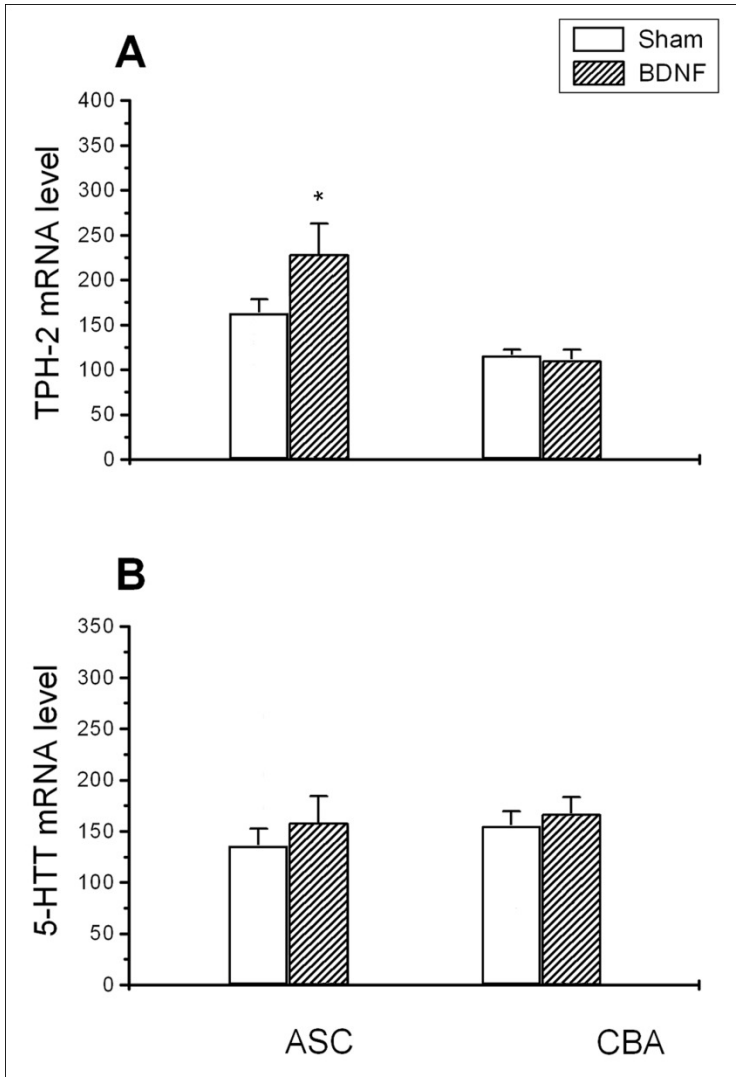
Functional activity of 5-HT2A receptor (A) and 5-HT2A receptor gene expression (B) in the brain of ASC and CBA mice treated with BDNF and control mice

Naumenko et al., 2012 (Neursci)



Functional activity of 5-HT1A receptor (A) and 5-HT1A gene expression (B) in the brain of ASC and CBA mice treated with BDNF and control mice

Naumenko et al., 2012 (Neursci)



Expression of the Tph-2 (A) and 5-HTT (B) genes in the midbrain of ASC and CBA mice treated with BDNF and control mice

Naumenko et al., 2012 (Neursci)

Journal of Neuroscience Research

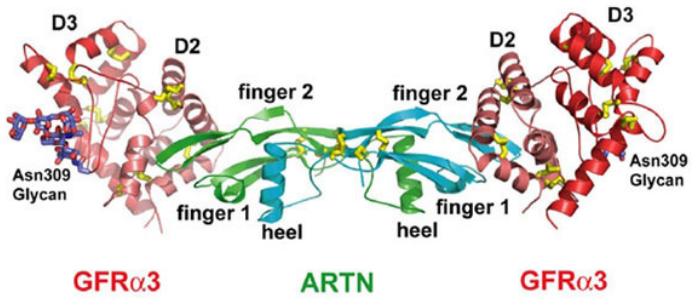
Journal of Neuroscience Research 91:1628–1638 (2013)

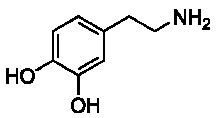
Effect of Glial Cell Line-Derived Neurotrophic Factor on Behavior and Key Members of the Brain Serotonin System in Mouse Strains Genetically Predisposed to Behavioral Disorders

Vladimir S. Naumenko,* Daria V. Bazovkina, Alina A. Semenova, Anton S. Tsybko, Tatyana V. Il'chibaeva, Elena M. Kondaurova, and Nina K. Popova

Department of Behavioral Neurogenomics, Institute of Cytology and Genetics, Siberian Division of the Russian Academy of Science, Novosibirsk, Russia

Glial cell line-derived neurotrophic factor is necessary for maintenance of adult nigrostriatal DA neurons and involved in the mechanisms of motor function and Parkinson's disease





Dopamine

Dopamine helps regulate

movement and muscle tone



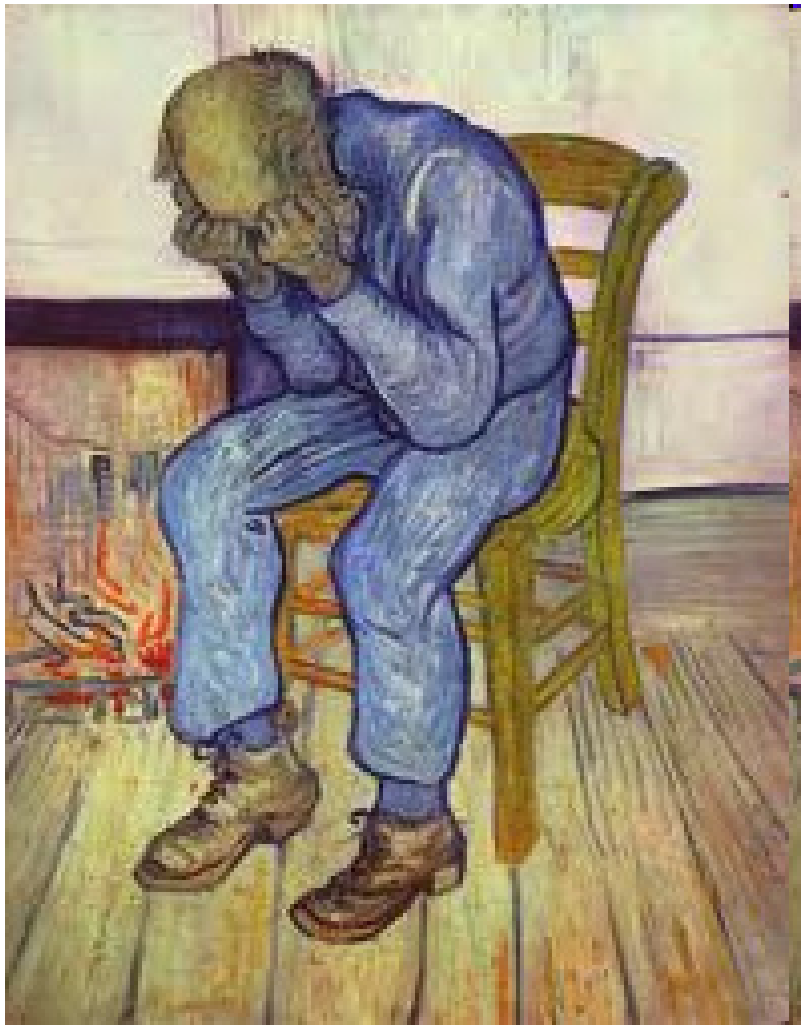
exercise-induced central fatigue

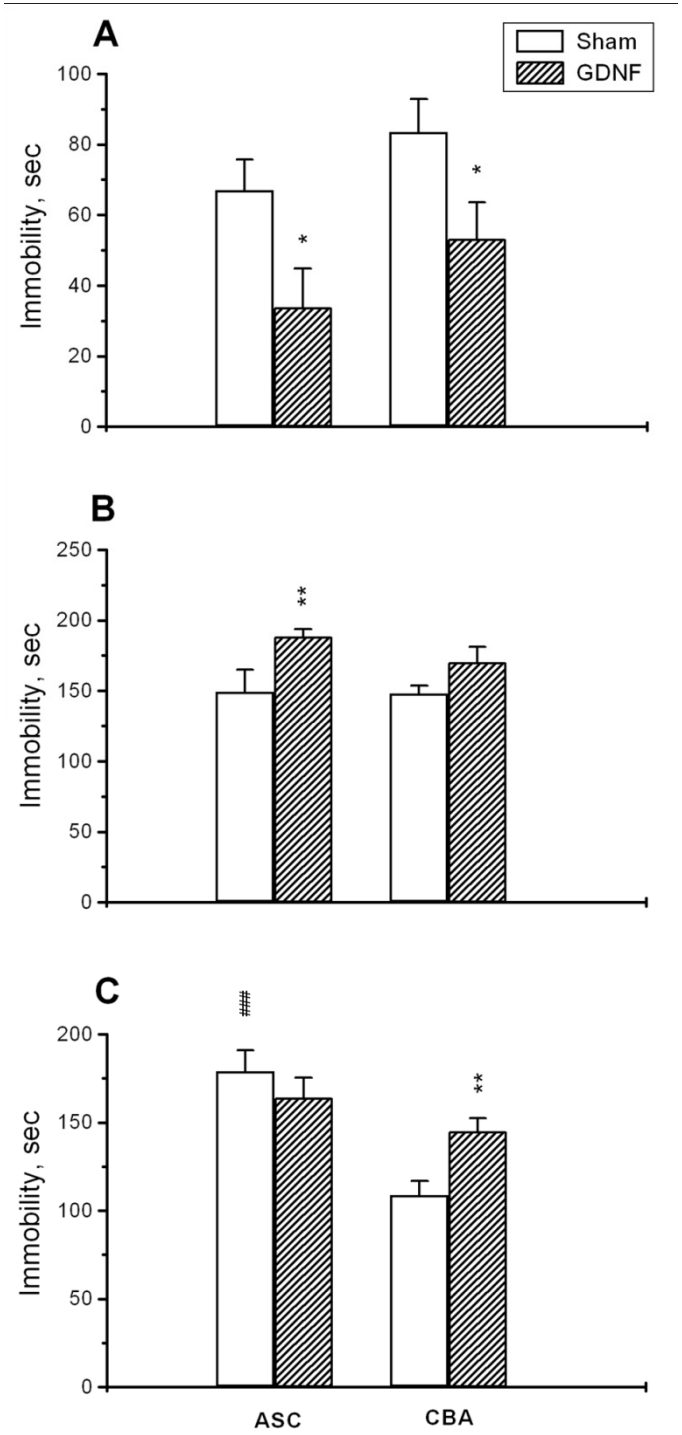


mood



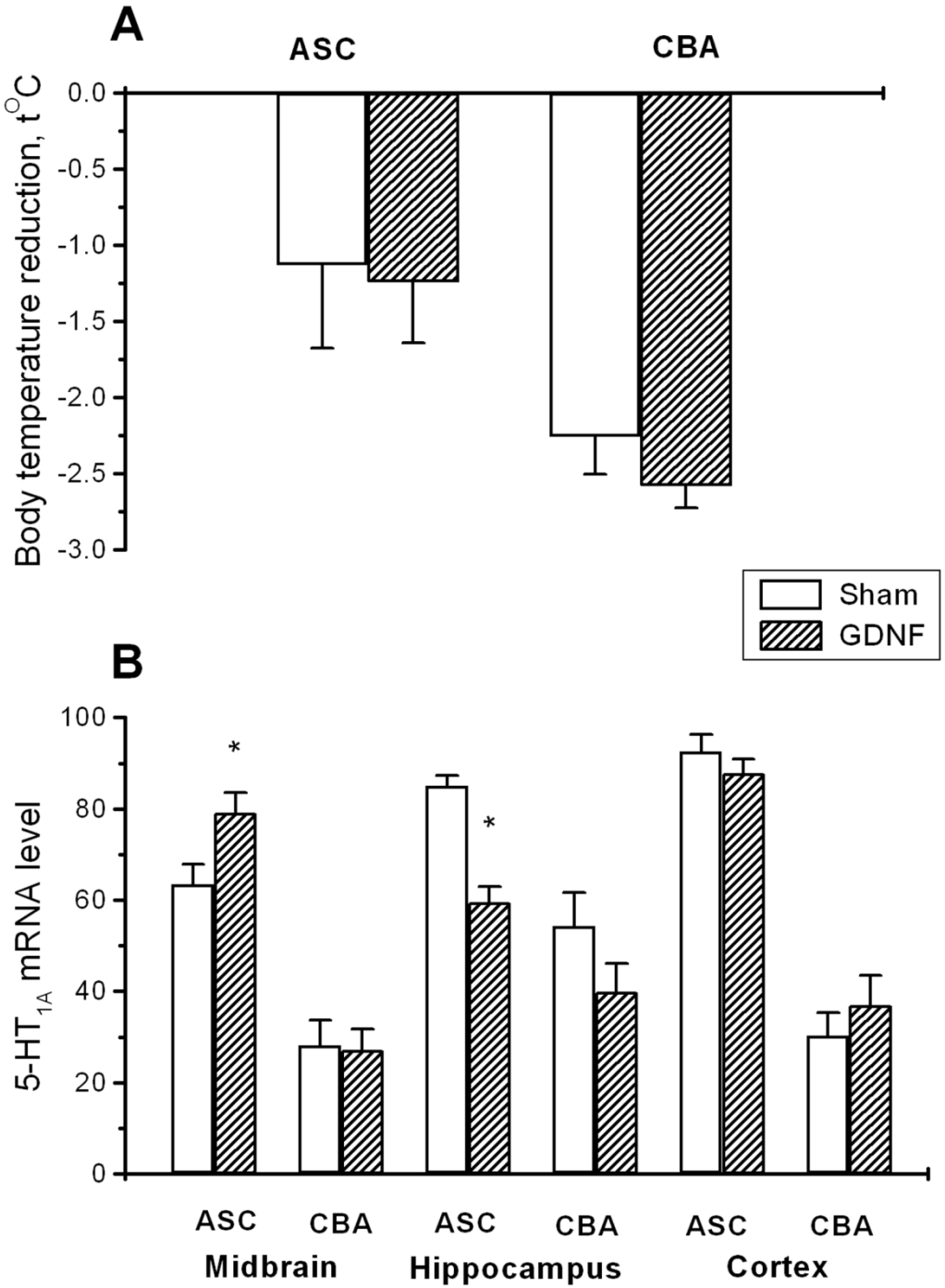
Disbalance in dopaminergic system is linked with Parkinson's and Alzheimer's deceases, major depression and schizophrenia





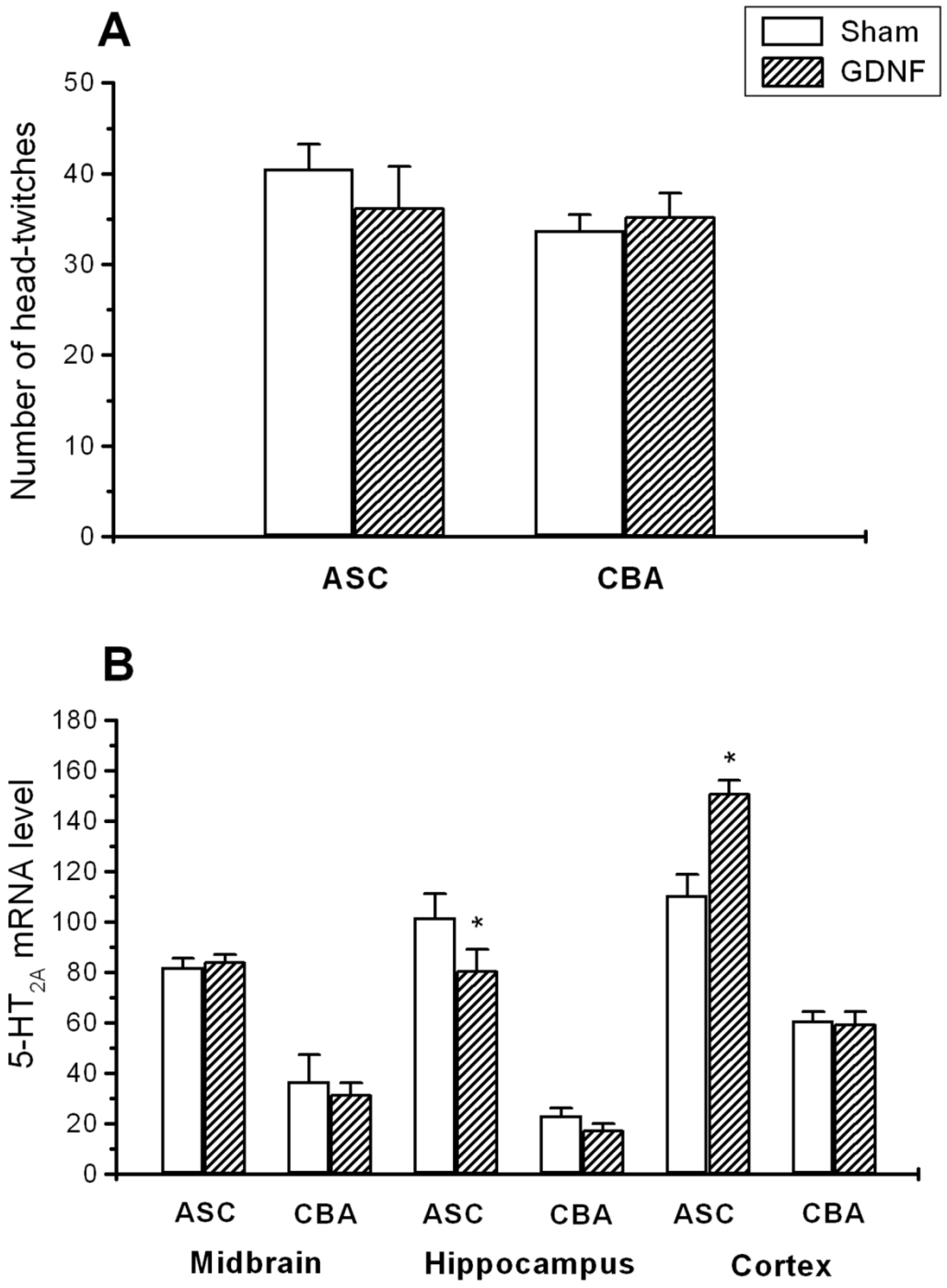
Effect of central GDNF administration on catalepsy (A), forced swim test immobility (B), and tail suspension test immobility (C) in ASC and CBA mice

Naumenko et al., 2013 (J Neursci Res)



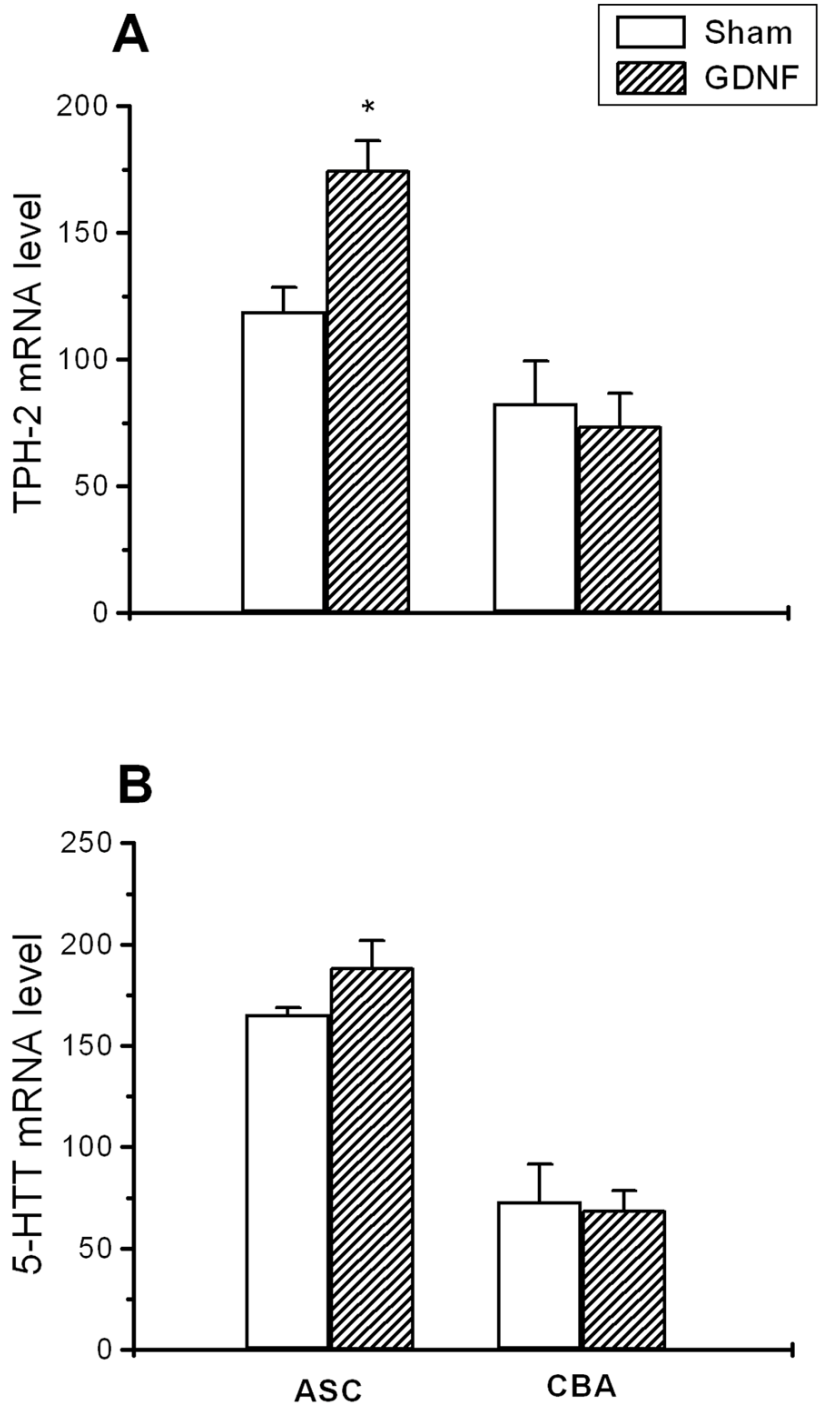
Effect of central GDNF administration on 5-HT1A receptor functional activity (A) and 5-HT1A receptor gene expression (B) in ASC and CBA mice

Naumenko et al., 2013 (J Neursci Res)



Effect of central GDNF administration on 5-HT2A receptor functional activity (A) and 5-HT2A receptor gene expression (B) in ASC and CBA mice

Naumenko et al., 2013 (J Neursci Res)



Effect of central GDNF administration on Tph-2 (A) and 5-HTT (B) genes expression in the midbrain of ASC and CBA mice

Naumenko et al., 2013 (J Neursci Res)

Journal of Neuroscience Research

Journal of Neuroscience Research 92:1035–1043 (2014)

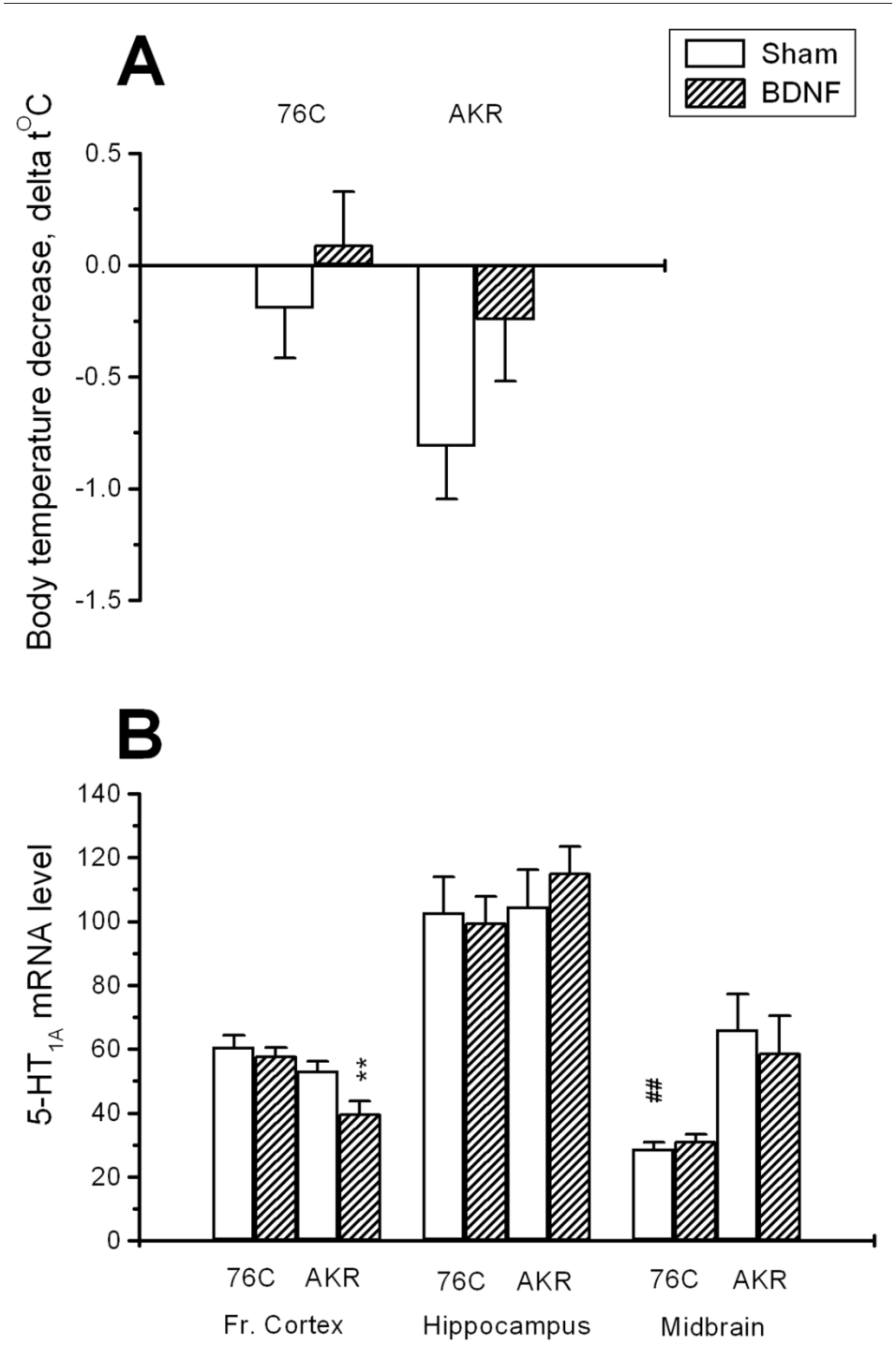
On the Role of 5-HT_{1A} Receptor Gene in Behavioral Effect of Brain-Derived Neurotrophic Factor

Vladimir S. Naumenko,* Elena M. Kondaurova, Daria V. Bazovkina, Anton S. Tsybko, Tatyana V. Il'chibaeva, and Nina K. Popova

Department of Behavioral Neurogenomics, Institute of Cytology and Genetics, Siberian Division of the Russian Academy of Science, Novosibirsk, Russia

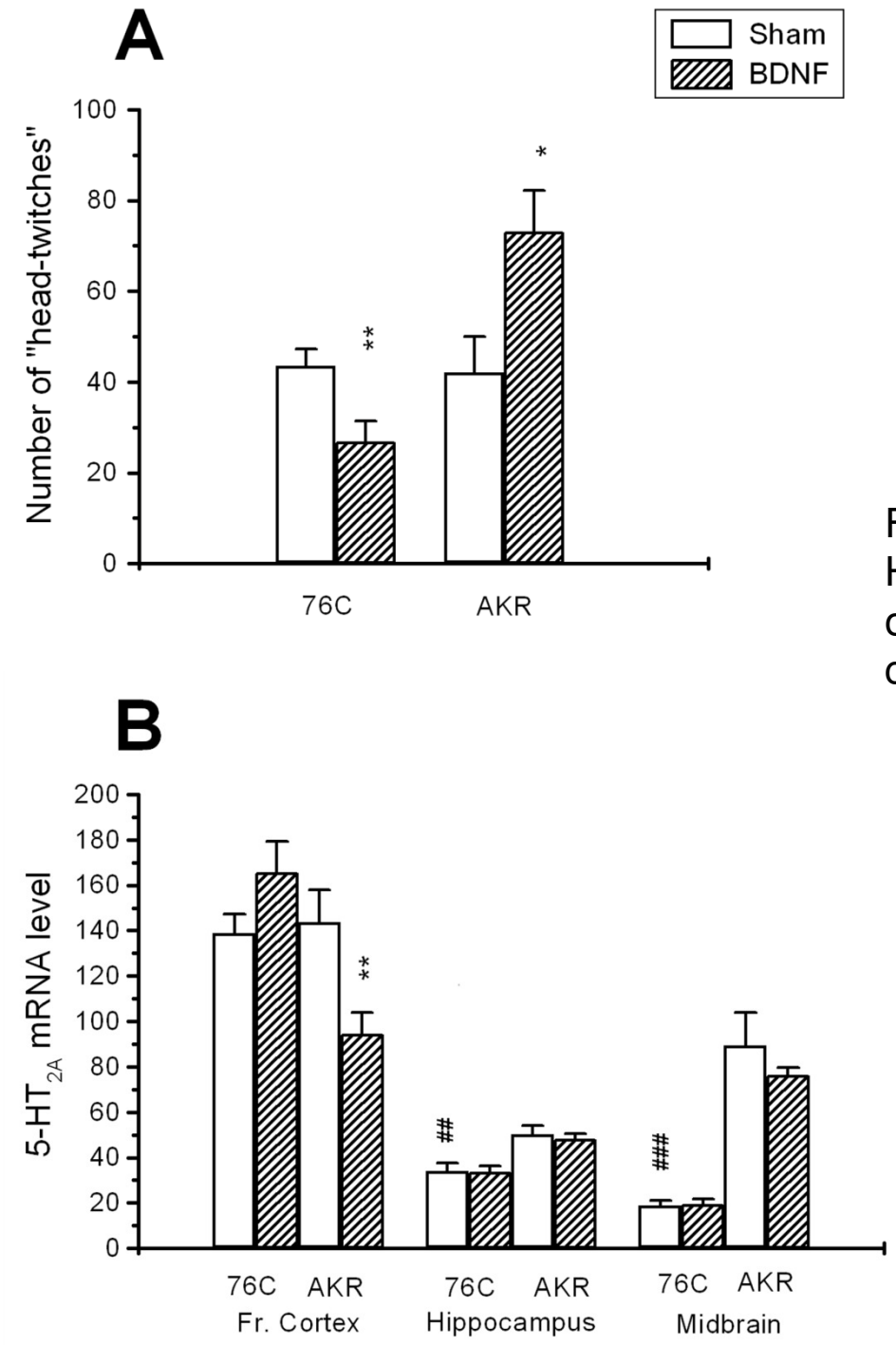
The experiments were carried out on adult male mice of AKR/J inbred strains and mice of congenic AKR.CBA-D13Mit76C strain. The congenic 76C mouse strain, with high predisposition to catalepsy and aggression, was created in our Laboratory by means of the chromosome 13 distal fragment transfer from CBA/Lac strain to AKR genetic background. As the result, the 76C mice carry the CBA-derived chromosome 13 distal fragment containing allele of 5-HT1A receptor gene on the AKR genetic background (Kulikov et al. 2008; Kulikov and Popova 2008).





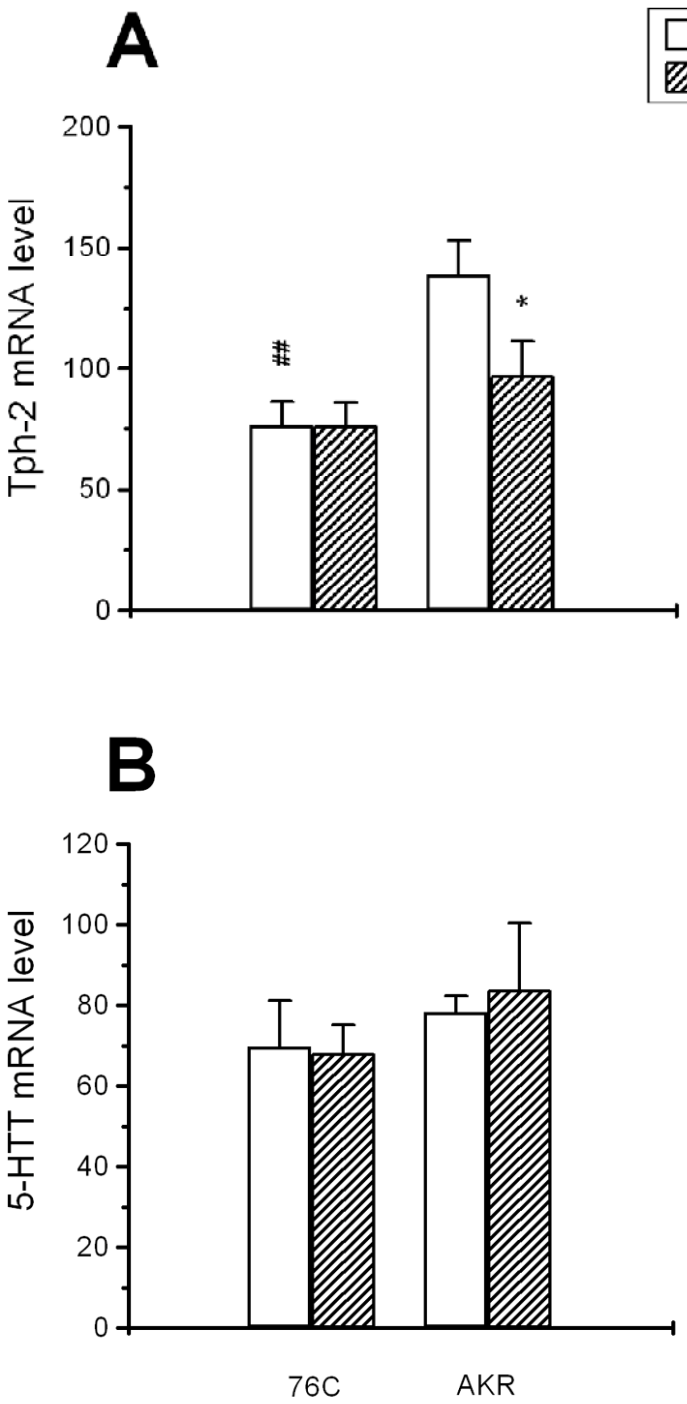
Functional activity of 5-HT1A receptor (A) and 5-HT1A receptor gene expression (B) in the brain of 76C and AKR mice treated with BDNF and control mice

Naumenko et al., 2014 (J Neursci Res)



Functional activity of 5-HT2A receptor (A) and 5-HT2A receptor gene expression (B) in the brain of 76C and AKR mice treated with BDNF and control mice

Naumenko et al., 2014 (J Neursci Res)



Expression of the tph-2 (A) and 5-HTT (B) genes in the midbrain of 76C and AKR mice treated with BDNF and control mice

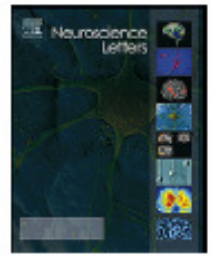
Naumenko et al., 2014 (J Neursci Res)

Neuroscience Letters 550 (2013) 115–118

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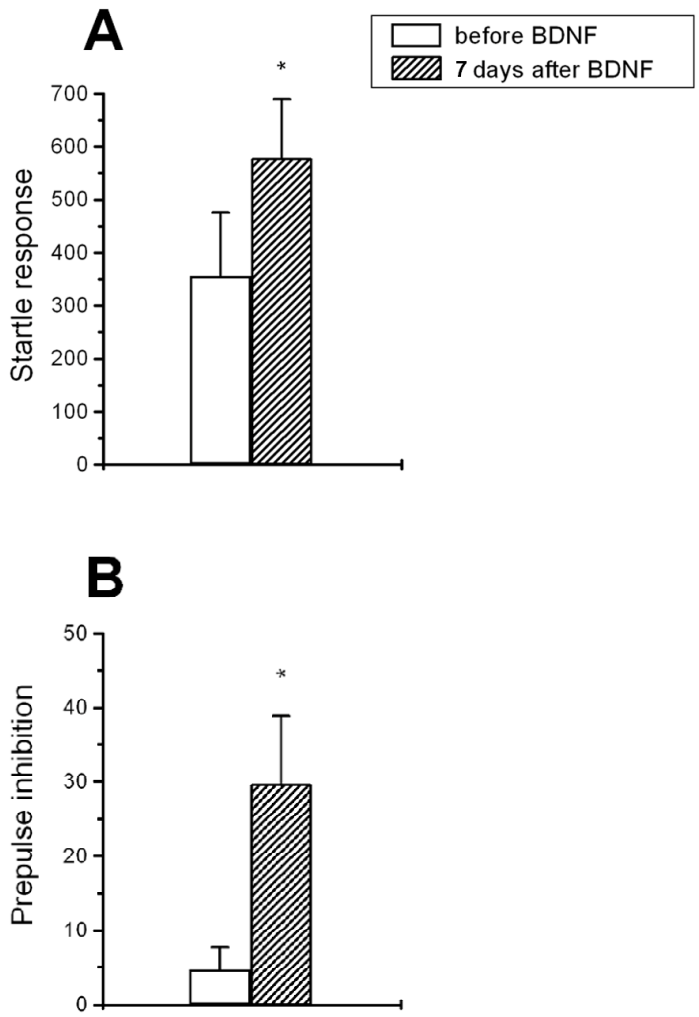
Effects of brain-derived and glial cell line-derived neurotrophic factors on startle response and disrupted prepulse inhibition in mice of DBA/2J inbred strain

Vladimir S. Naumenko*, Daria V. Bazovkina, Maryana V. Morozova, Nina K. Popova

Department of Behavioral Neurogenomics, Institute of Cytology and Genetics, Siberian Division of the Russian Academy of Science, Novosibirsk, Russia

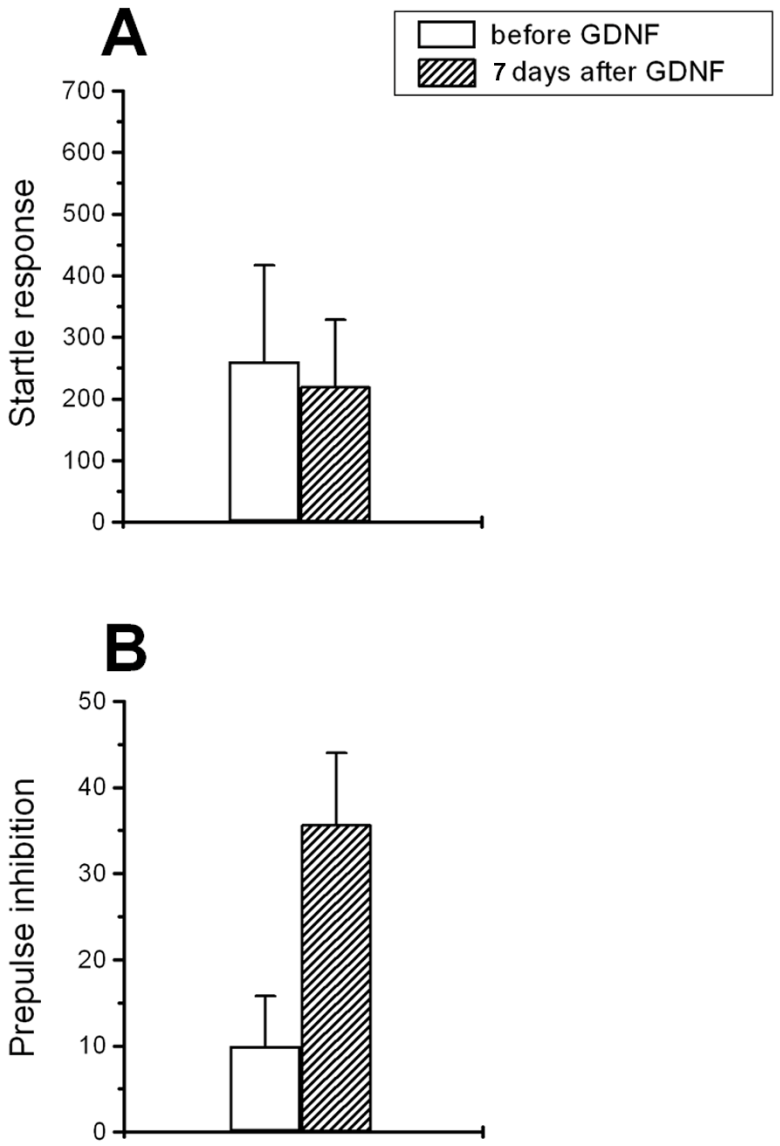
DBA/2J mice





Effect of BDNF on startle response and PPI in DBA/2J mouse strain

Naumenko et al., 2013 (Neursci Lett)



Effect of GDNF on startle response and PPI in DBA/2J mice

Naumenko et al., 2013 (Neursci Lett)

Central administration of both BDNF and GDNF neurotrophic factors affect different kinds of normal and pathological behavior. It seems to be that the effects of these neurotrophines are closely related to functional states of the key brain neurotransmitter systems such as brain serotonin and dopamine system. Obtained data provide new evidence on the existence of the cross-talk between brain neurotrophic factors and the brain neurotransmitter systems and on the important role of this cross-talk in the mechanisms underlying the contradictory behavioral responses to neurotrophic factors.

Federal Research Center Institute of Cytology and Genetics

Nina Popova
Elena Kondaurova
Alexander Kulikov
Daria Bazovkina
Anton Tsybko
Tatiana Ilchibaeva
Alina Semenova
Maryana Morozova


Thank you for your attention

Let us meet again..

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OMICS International

3rd World Congress on Pharmacology

On

August 08-10, 2016 at **Birmingham, UK**

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