**Material and Methods:** The study comprised 84 patients divided into three groups: patients with MS before initiating the therapy with IFN-Beta (MS0, n=28: 22 women, 6 men; average age: 28.8), patients with MS after at least one year of treatment with IFN-Beta (MS1, n=28: 22 women, 6 men; average age: 30.2) and a control group of patients with no intracranial pathology (CG, n=28: 20 women, 8 men; average age: 29.8).

**Aim:** The aim of this study was to assess changes in ADC values within normal appearing white matter (NAWM) and normal appearing gray matter (NAGM) in patients with MS before initiating the treatment with IFN-Beta and already in the course of treatment, in comparison with a control group.

**Methods:** Thirty-eight healthy participants were recruited. They were then randomised to either participate to an aerobic exercise programme twice a week for 16 weeks or to be part of a control group.

**Results:** The study was performed using a 1.5T GE MRI scanner. DWI sequence was performed with the following parameters: b = 1000, TR=8000, TE=81.2, slice thickness = 4 mm.

**Results:** In the examined areas of brain, in ROIs: 8 and 9 the ADC values were statistically significantly higher in MS0 group in comparison with CG (p < 0.01). There were no significant differences in ADC values in ROIs: 8 and 9 between MS1 and CG. However, in ROI 6 the ADC values were significantly lower (p < 0.01), while in ROIs: 10 and 11 significantly higher (p < 0.01) in MS1 group in comparison with CG.

**Conclusions:** Increased ADC values in NAWM of the frontal lobes in patients with MS before initiating the treatment with IFN-Beta may indicate early axonopathy, in the course of which diffusion is facilitated. Normalization of ADC values in this region after several months of treatment with IFN-Beta as well as decrease in ADC values in NAGM of right caudate nucleus may indicate a decrease of the diffusion and delay in the axonal damage as a result of immunomodulatory treatment.

**References**


**Effect of brain-derived neurotrophic factor genotype, gene expression and serum protein levels and childhood maltreatment on regional brain volume**

L.S. Van Velzen1*, L. Schmaal1, R. Jansen1, Y. Milaneshch1, M.J. Van Tol2, B.M. Elzinga3, N.J.A. Van der Wee3, D.J. Veltman1, B.W.J.H. Penninx1

1VU University Medical Center and GGZ inGeest, Department of Psychiatry and Neuroscience Campus Amsterdam, Amsterdam, The Netherlands; 2University Medical Center, Neuroimaging Center, Groningen, The Netherlands; 3Leiden University, Institute of Psychology and Leiden Institute for Brain and Cognition, Leiden, The Netherlands

**Background:** Childhood maltreatment (CM) has been associated with reduced volume of the hippocampus, amygdala and prefrontal cortex [1–3], which may partly be due to a direct impact on neural growth, e.g. through the brain-derived neurotrophic factor (BDNF) pathway. In addition, susceptibility for CM may be genetically determined as previous studies have reported an interaction between CM and BDNF genotype on brain volume [4,5]. However, findings on CM and BDNF pathway as determinants of brain volume are inconsistent and have never accounted for the entire BDNF pathway. We examined the effects of CM, the BDNF pathway (at the gene, gene expression and protein level) and their interactions on volume of the hippocampus and amygdala and thickness of the caudal and rostral anterior cingulate cortex (ACC).

**Methods:** Data were collected from 288 subjects in the NESDA study. CM was assessed using the Nemesis Childhood Trauma Interview. BDNF genotype, gene expression and serum protein levels were determined from blood samples and T1 magnetic resonance images were acquired at 3T. Regional brain volume and thickness were determined using FreeSurfer. Linear regression analyses with brain volume or thickness as dependent variables and BDNF genotype, gene expression and protein levels a independent variables were performed, while correcting for age, sex, education, scansite and intracranial volume.

**Results:** CM was associated with decreased volume of the amygdala (p = 0.018), but not hippocampus or thickness of the ACC. BDNF gene expression was positively associated with amygdala volume (p = 0.040). Gene-environment interaction analyses revealed that maltreated carriers of the BDNF met-allele show especially reduced amygdala volume (interaction effect: p < 0.001), while maltreated individuals with a val/val genotype show increased caudal and rostral ACC thickness (interaction effect: p = 0.003 and p = 0.034 respectively). BDNF gene expression was positively correlated with amygdala volume in subjects without a history of CM but this association was absent in subjects with a history of CM. We did not find any interaction effects on hippocampal volume. Abovementioned results were unaltered after an additional correction for SSRI use, smoking, presence of a psychiatric disorder and population structure. Furthermore, post-hoc tests revealed that the BDNF genotype and CM interaction effect on amygdala volume and the BDNF gene expression and CM interaction effect on amygdala volume were independent, indicating that the effect of BDNF genotype on amygdala volume could not be explained by an effect through BDNF gene expression.

**Conclusions:** CM and BDNF interact on multiple levels of the BDNF pathway to alter brain volume. Met-carriers appear to be more sensitive to the effects of early life stress on the amygdala, but not due to decreased BDNF gene expression. More fundamental research is needed to examine the mechanisms underlying the effect of maltreatment on brain volume and the role of the BDNF genotype.

**References**


**Self-regulation of the dopaminergic reward system via real time fMRI neurofeedback: a novel treatment approach for cocaine addiction**

M. Kirschner1*, P. Štampfl1, M. Hodel1, S. Hösli1, E. Engel1, L. Hulka1, J. Sulzer2, E. Seifritz2, B.B. Quednow1, M. Herdener1

1University of Zürich, Department of Psychiatry – Psychotherapy and Psychosomatics, Zürich, Switzerland; 2The University of Texas at Austin, Department of Mechanical Engineering, Austin, USA

**Introduction:** Cocaine addiction is a severe chronic disorder influencing neuroplasticity in the dopaminergic reward circuits [1]. These maladaptive neuronal changes contribute to compulsive drug use and reduced sensitivity to previously rewarding life situations or natural reinforcers [2]. However to date, no effective pharmaceutical or non-pharmaceutical treatment for cocaine addiction has been identified. Recent research in the field of real time fMRI revealed a novel method to self-regulate the dopaminergic reward system, i.e. neural activity in ventral tegmental area and substantia nigra (VTA/SN), with positive mental imagery and enhance imagery-based activation of these reward regions via real time fMRI mediated neurofeedback. Now, we tested this innovative method for the first time in a clinical population to investigate its potential capability as a novel non-invasive treatment strategy. We hypothesized that cocaine addicted patients can improve self-control over dopaminergic reward circuitry. As a consequence sensitivity to natural and alternative reinforcers may be enhanced and drug or drug cue induced sensitivity of the dopaminergic reward system may be reduced.

**Methods:** So far nine participants with cocaine use higher than 1 g/week and for the duration of at least 6 month and eight healthy