INTRODUCTION
Multiple sclerosis (MS) is a chronic disease causing multifocal demyelination and axonopathy within the brain [1,2]. Currently, immunomodulatory therapy, such as treatment with interferon beta (IFN-Beta), is applied to delay the progression of the disease [3]. New neuroimaging techniques are searched to allow better insight in the background of MS and monitoring the effectiveness of treatment [4]. One of the currently available magnetic resonance imaging (MRI) methods which could be proved useful in the assessment of the therapy is diffusion-weighted imaging (DWI), including the analysis of apparent diffusion coefficient (ADC) maps [5].

DWI is an advanced magnetic resonance imaging technique, based on the analysis of thermally-dependent movement of water molecules in the extracellular space [6]. This method allows to examine pathological changes at the cellular level which are not visible on conventional MRI. ADC is a mathematically calculated value indicating the diffusion [5]. Reduced ADC value demonstrates a restricted diffusion while increased ADC value indicates a facilitated diffusion, which may correspond with axonal loss or the loss of axonal myelin in the analysed region [5].

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 in patients already in the course of treatment, in comparison with a control group.

MATERIALS AND METHODS
The study comprised 84 patients divided into three groups:
1. Patients with MS before initiating the therapy with IFN-Beta (MS0), n=28: 22 women, 6 men; average age: 28.8;
2. Patients with MS after at least one year of treatment with IFN-Beta (MS1), n=28: 22 women, 6 men; average age: 30.2;
3. Control group of patients with no intracranial pathology (CG), n=28: 22 women, 6 men; average age: 29.8.

Markers of an area of approximately 200 mm² (± 6 mm²) were placed and ADC values were measured in each patient in 11 regions of interest (ROIs), as follows:
1. 2 – cerebellum at the level of dentate nuclei, right and left side, respectively,
2. 3 –pons,
3. 4, 5 – thalamus, right and left side, respectively,
4. 6, 7 – caudate nuclei, right and left, respectively,
8. 9 – fronto white matter regions, right and left, respectively,
9. 10, 11 – fronto-parietal white matter at the convexity, right and left, respectively.

The results were compared between the groups. Statistical analysis was performed using Student's t-test, the level of significance was set at p < 0.01. The study was performed using a 1.5T GE MRI scanner. DWI sequence was performed with the following parameters: b=0 and 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 other statistically significant differences were found between groups: MS0 and CG, MS1 and CG, as well as between MS0 and MS1. The exact results are presented in the tables and on the graph below.

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 water molecules diffusion is facilitated.
- Normalization of ADC values in this region after several months of treatment with IFN-Beta as well as decreases 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.
- Increased ADC values in left fronto-parietal white matter at the convexity in persons with MS treated with IFN-Beta could suggest the efficacy of the immunomodulatory therapy is not equal in every region of the brain and the delay in progression of the disease may only be partial.
- Further researches on DWI/ADC technique in the assessment of IFN-Beta therapy in MS on larger samples are needed in order to verify the presented outcomes.

REFERENCES
4. Bakshi R, Minagar A, Jaisani Z, Wolinsky JS. Imaging of multiple sclerosis: role in monitoring the effectiveness of treatment with interferon beta (IFN-Beta), is applied to delay the progression of the disease [3].

DISCLOSURE
I hereby declare that I have no potential conflict of interest.