Secondary progressive form of multiple sclerosis (SPMS) is characterized by a steady progression of clinical neurological damage with or without superimposed relapses and minor remissions and plateaus. Patients who develop SPMS will have previously experienced a period of RRMS, most of the untreated patients with RRMS will go on to develop SPMS in 10-20 years, time to transition is prolonged with a proper therapy. Based on clinical status alone, it is difficult to precisely establish when RRMS converts to SPMS although it is clearly important for appropriate treatment.

The aim of the study was to monitor the interaction between the clinical manifestation of the SPMS expressed in the Expanded Disability Status Scale (EDSS) and abnormal findings in magnetic resonance imaging (MRI) of the brain.

Twelve patients diagnosed with SPMS were included in this study, once a year the evaluation of the clinical status of the patient expressed in EDSS was performed, usually at the time of MRI examination. All patients underwent a MRI examination every 12 months for 3 years. Utilizing a special program developed in our Institution , the following parameters were evaluated during each MRI examination: brain tissue volume (brain atrophy status), lesion load in FLAIR sequence, volume of "„black holes"" (volume of pathological lesions on T1W).

The results of volumometry were correlated with changes in EDSS. In patients with SPMS, no statistical correlation was found between lesion load in FLAIR and EDSS and there was also no

significant statistical correlation between the volume of "„black holes“" and EDSS. However, we did confirm a significant correlation between increase in brain atrophy and clinical status.

In the second part of our study, we have compared the progression of brain atrophy over the course of 24 months in patients with SPMS, patients with RRMS and the healthy population with the aim of finding significant difference between these groups that could aid to differentiation between RRMS and SPMS based upon MRI findings. The progression of brain atrophy, expressed by brain parenchyma fraction (BPF) loss, is significantly the fastest and comparatively the greatest in SPMS patients in comparison to RRMS patients and in comparison to healthy population.

We postulate that an acceleration of BPF loss in RRMS patients could help to determine the transition to SPMS and thereby be an important correlate of disease progression.