

AbstractID: 8112 Title: Automated extraction of white matter regions in multiple sclerosis based on high resolution magnetic resonance imaging

Purpose: The atrophy of white matter (WM) in multiple sclerosis (MS) could correlate with the progression of MS. Therefore, quantitative diagnosis of the atrophy in WM regions is crucial for diagnosing or follow-up MS using magnetic resonance imaging (MRI), which should have high resolution. However, it is laborious for neuroradiologists to assess the area or volume of WM in MR images on a slice-by-slice basis. Our goal of this study was to develop an automated method for extraction of WM regions from high resolution MR images. **Method and Materials:** High resolution MR images (matrix size: 512×512 , pixel size: 0.43mm) of eight patients with MS lesions and four control subjects were acquired from a 3.0T MRI scanner. First, a brain parenchymal (BP) region was extracted from a T1-weighted image based on a statistical analysis of a gray-level histogram. Second, initial WM regions were segmented on a T2-weighted image by using an automated threshold technique for a gray-level histogram in the BP region. Third, the "nominal" WM region including basal ganglia was determined by means of a level set function changing with a speed function, which decreases at around boundaries between gray matter and WM regions. Finally, WM regions were determined by subtracting basal ganglia from the nominal region, which was segmented based on approximation of neighboring WM regions by using a two-dimensional second order equation. **Results:** For evaluation of our method, we calculated an overlap measure between the WM regions obtained by our method and neuroradiologists. As a result, the average overlap measure of WM regions was $73 \pm 6.8\%$ for 12 cases. **Conclusion:** Our automated extraction method of the white matter seemed fairly reliable, and might be useful for monitoring progression of MS.