Correlation between imaging findings of magnetic susceptibility weighted images and MIB-1 labeling index.

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Introduction: Phase shift and magnitude change induced by magnetic susceptibility is a sensitive image to deoxyganated blood in veins and hemorrhagic lesions (1). It is well known that in human glioma cells the levels of ferritin and transferrin detected at immunohistochemical analysis correlate with WHO grade of human brain glioma (2, 3). On the other hand, the clinical value of the Ki-67/MIB-1 labeling index (LI), the proportion of proliferating cells detected with MIB-1 antibody, is widely accepted as an indicator of grade of malignancy and a prognostic marker in predicting recurrence free survival in astrocytic tumors(4, 5). The purpose of this study was to evaluate the correlation of imaging findings of magnetic susceptibility weighted image with MIB-1 LI of brain astrocytomas

Methods: Phase sensitive imaging (PSI) is a susceptibility weighted imaging method, that generates contrast depends on phase shift and magnitude change induced by susceptibility. 40 patients with brain tumor examined with 3T MRI (GE, Signa HDx) including PSI between 2006 and 2008 were included in this study. PSI was obtained with TR / TE: 40 / 25ms, FA: 30°, acquisition matrix: 320 × 256, slice thickness: 2mm. Images were reviewed by two neuroradiologists without knowledge of histologic findings. Review was done independently but consensus reading was achieved about conflicted findings. Dark spots at PSI were graded on a scale of 1-4 subjectively. Grade 0: no dark spots in the tumor, grade1: proportion of dark spots in tumor is less than 20% (at the largest dimension), grade2: between 20-50%, grade3: more than 50%. Additional imaging features including the number of intratumoral arteries (grade 1: 0, grade 2: 1-2, grade 3: more than 3), intratumoral dilated veins (grading is equal to arteries), and with or without of dilated peritumoral veins

Results: Representative image findings and histological findings are shown in Table 1. Table 2 and Figure 1 show grades of dark spots of astrocytic tumors. In this group statistically significant difference of MIB-1 LI between grade 2 and grade 3 was found (p=0.002, Bonferroni - Holm test). In addition, there was statistically significant difference of MIB-1 LI between low grade group (grade 1 and grade 2) and high grade group (grade 3 and grade 4) (p=0.0038, Mann-Whitney U test). In all tumors no statistically significant association was detected between dark spots at PSI and MIB-1 LI.

Conclusion: Our results indicate that the degree of dark spots in PSI correlates with MIB-1 LI. Evaluation of dark spots with PSI may be helpful to predict tumor grade and prognosis in human astrocytomas.

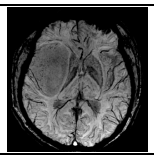
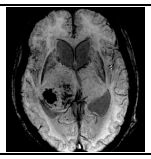
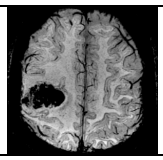
PSI image			
Age and sex	36-y/o woman	74-y/o woman	58-y/o man
Grade of dark spots	2	3	4
Grade of intratumoral arteries	2	1	0
Grade of intratumoral veins	0	0	not applicable
Dilated peritumoral vein	not present	present	not present
Histology (WHO grade)	astrocytoma (grade 2)	astrocytoma (grade 3)	glioblastoma
MIB-1 LI	4	25	30

Table 1: Representative cases

Grade of dark spots	MIB-1 LI Median (min – max)	Number of cases
1	4.58(5-20)	3
2	7.5(4-15)	8
3	35.4(2-70)	5
4	20(10-30)	5

Table 2: Grade of dark spots and MIB-LI

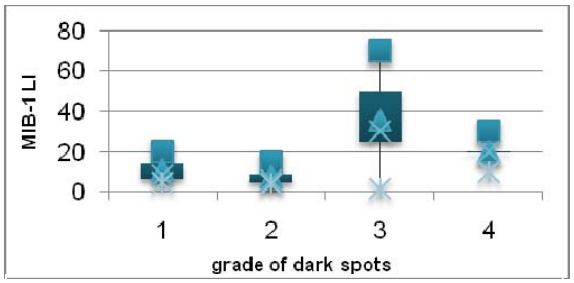


Figure 1: grade of dark spots and MIB-1 LI

Refferences: (1) Haacke, et al. AJNR 2009. (2) Recht, et al. J Neurosurg 1990. (3) Prior, et al. Virchows Arch 1990. (4) Anne, et al. Pathol Oncol Res 2006. (5) Angela, et al. Pathol Oncol Res 2001.