

## Differentiation between low and high grade in non-enhancing cerebral gliomas and neuronal- glial tumors

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**Background and Purpose:** It is important to pre-operatively grade the non-enhancing supratentorial gliomas and neuronal-glial tumors(NEGNGT) as earlier studies have indicated that up to 45% of the non-enhancing supratentorial gliomas are malignant. This is, however, difficultly on conventional MR imaging which led us to evaluate some other imaging parameters. The aim of this study was to compare some of the new imaging methods, including Diffusion tensor imaging (DTI), MR perfusion weighted imaging(PWI) and MR spectroscopic imaging with regard to their ability in differentiating between low and high grade NEGNGT.

**Method and materials:** 50 patients with histology confirmed NEGNGT were included. 33 patients had a low grade tumor (WHO grade 1 and 2) and 17 a high grade (WHO grade 3 and 4). The imaging parameters, including maximal relative cerebral blood volume (rCBV), maximal Fractional anisotropy (FA), mean FA and mean FA ratio, minimal trace apparent diffusion coefficient (trace ADC), Choline/Creatine(Cho/Cr) and Choline/N-acetylaspartate (Cho/NAA) ratios in the tumor were compared and the results were tested by Mann-Whitney U test and receiver operating characteristic (ROC) analyses for optimal grading threshold.

**Results:** The mean values of each imaging parameters and statistical result were summarized in Table 1. In general, there were significant differences of mean FA, mean FA ratio and maximal FA between low and high grade NEGNGT( $p<0.05$ ), but no significance was found in this study for maximal rCBV, minimal ADC, Cho/Cr and Cho/NAA ratios. Furthermore, a ROC analysis showed that a maximal FA cutoff value of 0.264 differentiated between low and high grade with a sensitivity of 91.7% and a specificity of 88.9%, which is better than the other imaging parameters.

**Conclusions:** The study suggests that the maximal FA value is the best for grading NEGNGT, better than maximal rCBV, and the Cho/Cr and Cho/NAA ratios in MR spectroscopy imaging. The maximal FA value may be an optimal adjuvant tool to differentiate between low and high grade in non-enhancing supratentorial gliomas and neuronal-glial tumors.

Table 1: Statistical analysis of imaging parameters in differentiating low and high grade on-enhancing supratentorial gliomas and neuronal-glial tumors

Index	Low grade (Mean±SD)	High grade (Mean±SD)	<i>p</i> value of M-W Test	Area under curve	Cutoff value	Sensiti vity	Specific ity
Mean FA	0.1336±0.0423	0.1908±0.039	$p<0.001$	0.907	0.144	0.917	0.833
Mean FA ratio	0.3047±0.1982	0.3994±0.1177	0.009	0.782	0.354	0.583	0.833
Maximal FA	0.1962±0.0889	0.3827±0.0863	$p<0.001$	0.931	0.264	0.917	0.889
Minimal ADC	1.147±0.4445	0.8877±0.4086	0.065	0.299	0.912	0.417	0.333
rCBV	1.8±1.368	2.236±1.328	0.106	0.645	1.836	0.5	0.656
Cho/Cr	2.176±1.498	2.383±0.784	0.087	0.688	2.28	0.5	0.778
Cho/NAA	2.155±1.753	3.092±2.271	0.2	0.644	2.014	0.583	0.667