Apparent diffusion coefficient (ADC) values have been shown to assist in differentiating cerebellar pilocytic astrocytomas and medulloblastomas. Previous studies have applied only ADC measurements and calculated the mean/median values.

Wagner et al., investigated the value of diffusion tensor imaging (DTI) histogram characteristics of the entire tumor for differentiation of cerebellar pilocytic astrocytomas and medulloblastomas.

Presurgical DTI data were analyzed with a region of interest (ROI) approach to include the entire tumor. For each tumor, histogram-derived metrics including the 25th percentile, 75th percentile, and skewness were calculated for fractional anisotropy (FA) and mean (MD), axial (AD), and radial (RD) diffusivity. The histogram metrics were used as primary predictors of interest in a logistic regression model. Statistical significance levels were set at $p < .01$.

The study population included 17 children with pilocytic astrocytoma and 16 with medulloblastoma (mean age, 9.21 ± 5.18 years and 7.66 ± 4.97 years, respectively). Compared to children with medulloblastoma, children with pilocytic astrocytoma showed higher MD (P = .003 and P = .008), AD (P = .004 and P = .007), and RD (P = .003 and P = .009) values for the 25th and 75th percentile. In addition, histogram skewness showed statistically significant differences for MD between low- and high-grade tumors (P = .008).

The 25th percentile for MD yields the best results for the presurgical differentiation between pediatric cerebellar pilocytic astrocytomas and medulloblastomas. The analysis of other DTI metrics does not provide additional diagnostic value. Our study confirms the diagnostic value of the quantitative histogram analysis of DTI data in pediatric neuro-oncology [1].

1)
Wagner MW, Narayan AK, Bosemani T, Huisman TA, Poretti A. Histogram Analysis of Diffusion Tensor Imaging Parameters in Pediatric Cerebellar Tumors. J Neuroimaging. 2016 May;26(3):360-5. doi: 10.1111/jon.12292. Epub 2015 Sep 2. PubMed PMID: 26331360.