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Usefulness of magnetic resonance imaging characteristics in discriminating H3 K27M-mutant gliomas from wildtype gliomas in spinal cord

Benqi Zhao ^{# 1}, Jingjing Yao ^{# 2}, Junkai Wang ¹, Jie Li ¹, Wei Shi ³, Chen Zhang ¹, Xihai Zhao ^{1 4}, Jian Qiao ¹, Yongqiang Ma ¹, Yilan Xu ¹, Zhuozhao Zheng ⁵

Affiliations

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Abstract

Aim: The aim of this study was to determine the usefulness of magnetic resonance imaging (MRI) characteristics in discriminating H3 K27M-mutant gliomas from wildtype gliomas in the spinal cord.

Materials and methods: Fifty-eight patients with spinal cord gliomas were enrolled in this study. The H3 K27 gene status was identified by Sanger sequencing or immunohistochemistry test of resection tumor specimens. The MR imaging characteristics were evaluated and compared between H3 K27M-mutant and wildtype gliomas using the χ^2 test and the Mann-Whitney U test.

Results: Of 58 recruited patients, 23 (39.7%) were diagnosed with H3 K27M-mutant glioma. The H3 K27M-mutant gliomas were found to more likely occur in men compared with wildtype gliomas (87.0% vs. 42.9%, $p = 0.001$). On T2-weighted MR images, the signal-to-noise ratio (SNR) of H3 K27M-mutant gliomas was significantly lower than that of wildtype gliomas (103.9 ± 72.0 vs. 168.9 ± 86.8 , $p < 0.001$). Of 35 wildtype tumors, 60% showed well-defined margin but this feature was not found in all mutant tumors ($p < 0.001$). The SNR of tumors on contrast-enhanced T1-weighted images of the H3 K27M-mutant gliomas was significantly lower than that of wildtype gliomas (187.7 ± 160.4 vs. 295.1 ± 207.8 , $p = 0.006$). Receiver operating-characteristic analysis revealed that area under curve (AUC) of combination of $1/\text{SNR}$ on T2-weighted images, $1/\text{SNR}$ on contrast-enhanced T1-weighted images, ill-defined margin, and sex reached 0.937 (95% CI, 0.873-1.000) in discriminating H3 K27M-mutant gliomas.

Conclusions: The MR imaging characteristics are valuable in discriminating H3 K27M-mutant from wildtype gliomas in the spinal cord and the combination of these imaging features with sex had a high strength in this discrimination.

Keywords: Glioma; H3 K27M; MRI; Spinal cord.

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