Clinical and molecular characteristics and prognostic factors of diffuse astrocytoma, IDH-wildtype, not elsewhere classified

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Aims and scope

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Abstract

Purpose

The clinical nature of IDH-wildtype astrocytoma, not elsewhere classified (NEC), is poorly understood. To this end, we aimed to investigate the clinical, molecular, imaging, and prognosis of histological grade 2 and 3 IDH-wildtype diffuse astrocytoma, NEC.

Methods

Retrospective chart and imaging reviews were performed for 46 patients with IDH-wildtype diffuse astrocytoma, NEC. Data regarding clinical, histopathological, molecular markers, MRI findings, and the extent of resection were collected. Univariable and multivariable Cox analyses were performed for overall survival (OS).

Results

The median OS was 45.0 months (95% CI 27.7–62.4). Multivariable analysis identified older age at diagnosis (hazard ratio [HR] = 1.10, $P = 0.007$), higher Ki-67 index (HR = 1.09, $P = 0.002$), and non-gross total resection (HR = 3.57, $P = 0.042$) as independent predictors of unfavorable OS. Tumors with genetic alterations such as amplification of *KIT* ($P = 0.024$) and *PDGFRA* ($P = 0.034$), and mutations in *ATM* ($P = 0.050$) showed an increased Ki-67 index. Tumors with higher histological grade ($P < 0.001$) and infiltrative appearance on MRI ($P = 0.029$) also showed an increased Ki-67 index. For patients with Ki-67 index ≥ 5, addition of adjuvant temozolomide therapy resulted in a survival benefit ($P = 0.014$).

Conclusion

Our findings support the importance of maximal safe resection and prognostic value of the Ki-67 index in this tumor. *KIT*, *PDGFRA* amplification and *ATM* mutations were associated with the increased Ki-67 indices, and targeted therapies against these alterations warrant further investigation.

Data availability

No datasets were generated or analysed during the current study.

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Contributions

Chan Woo Wee and Yae Won Park conceived the study and supervised the manuscript preparation. Woo Jong Cho analyzed and interpreted data and wrote the manuscript text. Kaeum Choi and

Kyunghwa Han provided statistical support. Sung Soo Ahn and Yae Won Park performed the radiological analysis. Seo Hee Choi, Hong In Yoon, Seok-Gu Kang, Jong Hee Chang, Se Hoon Kim, and Seung-Koo Lee contributed to data acquisition. All authors discussed the results and approved of the final manuscript.

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Ethics declarations

Ethics approval and consent to participate

Patient consent was waived owing to the retrospective study design from the institutional review board of Yonsei university (Approval number: 2024-3288-001).

Competing interests

The authors declare no competing interests.

Additional information

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Supplementary Information

Below is the link to the electronic supplementary material.

Supplementary Material 1

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