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Adult diffuse IDH-wildtype lower-grade gliomas with PDGFRA gain/amplification should be upgraded as glioblastoma

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Abstract

We explored the prognostic significance of platelet-derived growth factor receptor α (PDGFRA) gain/amplification in grade 2-4 adult gliomas to assess its value as an upgrading indicator. Fluorescence in situ hybridization was performed to detect PDGFRA gain/amplification in 321 glioma specimens from Sun Yat-sen University Cancer Center (SYSUCC). Data from 1934 cases with available next-generation sequencing results from The Cancer Genome Atlas (TCGA) and cBioPortal were also analyzed. Of the adult grade 2-4 gliomas, 12.15% (39/321), 8.76% (93/1062), and 6.88% (60/872) had PDGFRA gain/amplification in the SYSUCC, TCGA, and cBioPortal cohorts, respectively. Grade 4 glioblastomas had a greater PDGFRA gain/amplification rate than lower-grade gliomas (LGGs) in all cohorts (all $P < .05$). PDGFRA gain/amplification was associated with older age, greater World Health Organization grade, isocitrate dehydrogenase (IDH)-wildtype, intact 1p/19q, telomerase reverse transcriptase promoter-wildtype, greater Ki67 index, epidermal growth factor receptor amplification, and chromosome 7+/10- alterations. PDGFRA gain/amplification predicted poor overall survival (OS) in grade 2-4 gliomas, particularly IDH-wildtype LGGs, in all cohorts (all $P < .05$). OS was worse in PDGFRA-amplified IDH-wildtype LGGs than in IDH-wildtype glioblastomas in the cBioPortal ($P = .031$) and SYSUCC ($P = .026$) cohorts. PDGFRA gain/amplification predicted poor OS in adult diffuse IDH-wildtype LGGs and may serve as an upgrading indicator.

Keywords: FISH; IDH; PDGFRA; glioblastoma; lower-grade glioma (LGG); prognosis.