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# Expression of heparan sulfate proteoglycans in glioblastoma and their potential as prognostic biomarkers: A bioinformatic analysis

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**INTRODUCTION**: Glioblastoma is the most aggressive brain tumor, requiring new biomarkers to support diagnosis and prognosis. Heparan sulfate proteoglycans, such as Glypicans and Syndecans, participate in essential pathways of tumor biology. Their alterations may influence GBM progression, and bioinformatic analyses help define their expression patterns and clinical relevance. **METHODS**: An exploratory, retrospective study was conducted using bioinformatic analysis of public TCGA and GTEx data via GEPIA, evaluating HSPG expression in glioblastoma and its relationship with survival. Protein interactions (STRING), functional enrichment (Enrichr), and a narrative literature review were also performed to contextualize the findings. The study was approved by the Ethics Committee for using only public and anonymized data. **RESULTS**: Analysis of TCGA and GTEx data in GEPIA showed overexpression of GPC2, GPC4, GPC6, SDC1, SDC2, and SDC3, while GPC5 was reduced and SDC4 remained similar to normal tissue. Only GPC5 and SDC1 were associated with poorer prognosis. In STRING, SDC1 interacted directly with FN1, TNC, MMP9, and ITGAV, whereas GPC5 showed no connections. Functional enrichment highlighted pathways related to extracellular matrix, integrins, cell migration, and tumor progression. **DISCUSSION**: Integrated analysis revealed heterogeneous expression of HSPGs in glioblastoma, highlighting only SDC1 and GPC5 as relevant biomarkers. SDC1 demonstrated overexpression, worse prognosis, and involvement in adhesion and invasion pathways. GPC5 showed a context-dependent effect: although reduced in tumors, higher intratumoral levels were associated with lower survival and pro-proliferative pathways. These findings suggest SDC1 as a regulator of the tumor microenvironment and GPC5 as a modulator in specific disease subgroups. **CONCLUSION**: The results identify SDC1 and GPC5 as the most relevant HSPGs in glioblastoma, with consistent impacts on expression and prognosis. SDC1 integrates networks associated with adhesion and invasion, while GPC5 acts in a context-dependent manner, linked to poorer survival in patient subgroups. These findings reinforce their potential as functional targets and biomarkers.

**KEYWORDS**: Glioblastoma; Biomarkers; Tumor; Heparan sulfate proteoglycans.

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