

<https://doi.org/10.7124/bc.000BAE>

**A.R. Shloma¹, K.I. Solomiana¹, P.O. Areshkov¹,
O.V. Zhuk¹, O.V. Anopriienko¹, T.V. Bukreieva^{1,2}, I.Ya. Skrypkinska¹**

¹ Institute of Molecular Biology and Genetics, NAS of Ukraine
150, Akademika Zabolotnoho Str., Kyiv, Ukraine, 03143

² Institute of Cell Therapy
3, Liubomyra Huzara Ave., Kyiv, Ukraine, 03126
sonnedame96@gmail.com

OVEREXPRESSION OF THE SHORT TRANSCRIPTOMIC ISOFORM OF *CHI3L1* RESULTS IN THE SUPPRESSED INVASIVE CAPABILITIES OF GENERATED GLIOBLASTOMA SPHEROIDS

Aim. Glioblastoma (GBM) is the most common brain tumor and is largely incurable due to its propensity to invasion and treatment resistance. GBM's aggressiveness correlates with its high degree of heterogeneity, both when it comes to genomic alterations and to stroma architecture. In this study we consider both aspects of GBM heterogeneity, combining the investigation of the *CHI3L1* gene and its short transcriptomic isoform *CHI3L1-Δ8* with the 3D cell culturing model (spheroids), considered to be more representative of tumor stroma. **Methods.** Cell lines: human GBM U251 MG and its transgenic derivatives overexpressing next mRNAs: full-length *CHI3L1* (U251-*CHI3L1*-FL); only the short isoform (deletion of exon 8) (U251-*CHI3L1*-Δ8); control copGFP (U251-GFP). A) Spheroid formation from U251-GFP cells in low-adhesion microwells was evaluated by ICC using antibodies to PCNA (proliferation) and Cas3 (apoptosis), with changing parameters being density at seeding (1K vs 5K cells per microwell) and incubation time (48h; 72h; 96h). B) Analyzing the above data, next spheroid formation parameters were chosen for all cell lines: 5K cells and 72h of incubation. After formation spheroids were transferred into the matrigel and invasion was monitored for the next 48h. **Results.** A) Comparison of seeding densities and incubation time revealed no shifts in PCNA or Cas3 in U251-GFP spheroids, indicating that these factors did not substantially affect proliferation or apoptosis. This informed the parameters of the invasion assay, allowing us to incubate spheroids of higher density (5K) for a moderate time (72h), in order to achieve more cell-cell interactions without compromising cell health; B) A marked isoform-dependent difference in invasion was observed: spheroids overexpressing *CHI3L1*-Δ8 had an invasion rate more than 2x slower than that of the other lines ($p < 0.05$). **Conclusions.** Spheroids of GBM cell line and its derivatives were generated in low-adhesion microwells. Crucially, our main results support previous findings on differential roles of two isoforms of *CHI3L1* in GBM progression, with *CHI3L1*-Δ8 expressing cells having stunned invasion capabilities compared to other lines, which is consistent with the evidence that exon 8 deletion prevents efficient secretion of *CHI3L1* protein, possibly inhibiting pro-migratory and pro-tumorigenic signaling. **Grants.** This study was funded by the National Research Foundation of Ukraine: grant 2023.03/0245

Keywords: glioblastoma, *CHI3L1*, spheroids, invasion assay.

Received: 08.06.2026; Accepted: 08.09.2026; Published: 29.09.2026

Citation: Shloma A.R., Solomiana K.I., Areshkov P.O., Zhuk O.V., Anopriienko O.V., Bukreieva T.V., Skrypkinska I.Ya. (2026) Overexpression of the short transcriptomic isoform of *CHI3L1* results in the suppressed invasive capabilities of generated glioblastoma spheroids. *Biopolymers & Cell*, Special issue(42), 117. <https://doi.org/10.7124/bc.000BAE>
© Publisher PH "Akademperiodyka" of the NAS of Ukraine, 2026. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited