A GUM-LIKE IMPLANT FOR THE LOCAL TREATMENT OF THE POST-OPERATIVE GLIOBLASTOMA

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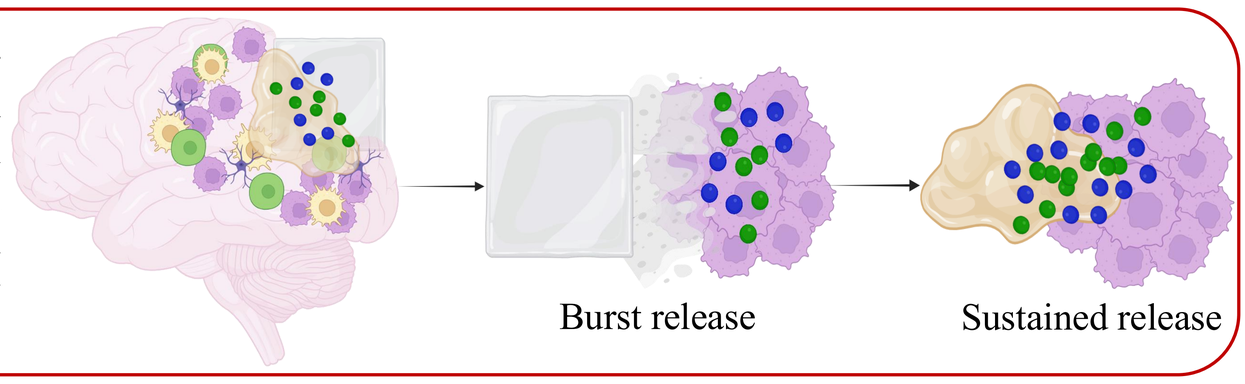
Introduction

Glioblastoma (GBM) is the most aggressive and lethal primary brain tumour in adults. Despite the standard Stupp protocol (surgical resection, radiotherapy, and temozolomide chemotherapy) and the development of innovative therapeutic approaches GBM remains incurable. This is mainly due to its unique biological characteristics, including a highly infiltrative growth pattern, an immunosuppressive tumour immune microenvironment (TIME), and the presence of the blood–brain barrier (BBB), which collectively limit the efficacy of targeted therapies. In this context, locoregional drug delivery strategies represent a promising approach to overcome these challenges and improve therapeutic outcomes [1–3].

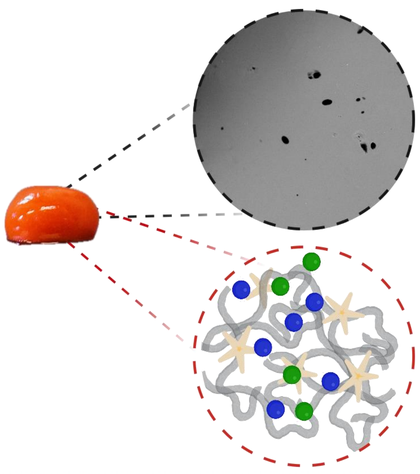
Aim

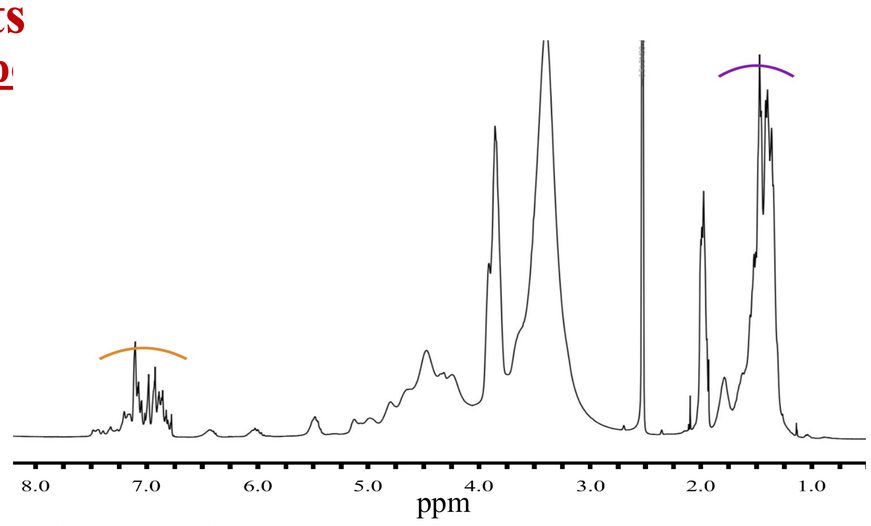
We developed a soft gum-like implant designed to conform to the irregular margins of the post-surgical GBM resection cavity and surrounded by a rigid outer matrix. Both compartments are loaded with Docetaxel (DTX) and Resiquimod (RES), enabling an initial burst release to eradicate residual tumour cells, followed by a sustained release to target infiltrative and therapy-resistant cells. This dual-release strategy aims to reduce tumour recurrence while simultaneously promoting an anti-tumour immune response.

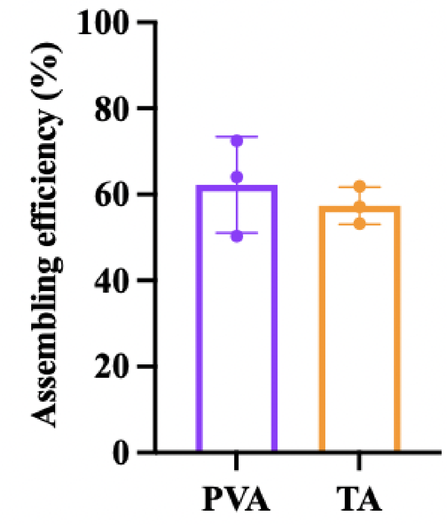


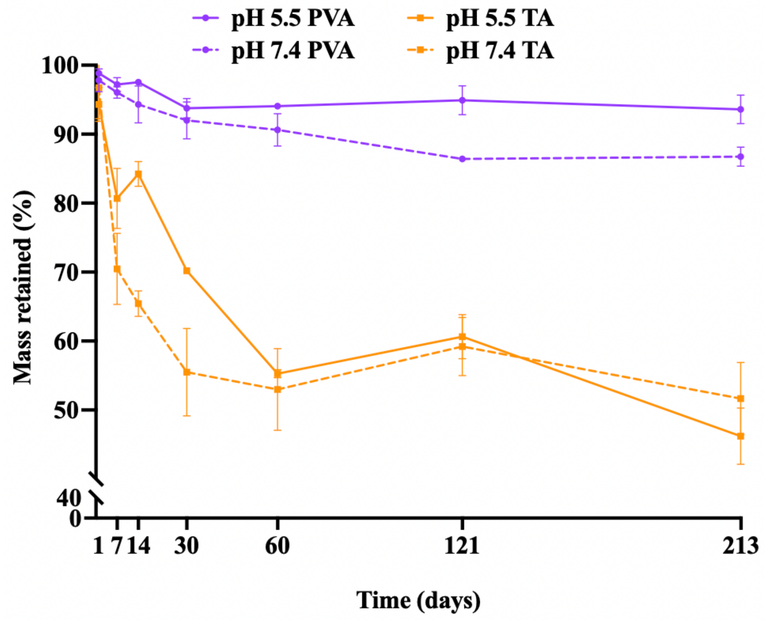
Results

Gum-like implant comp

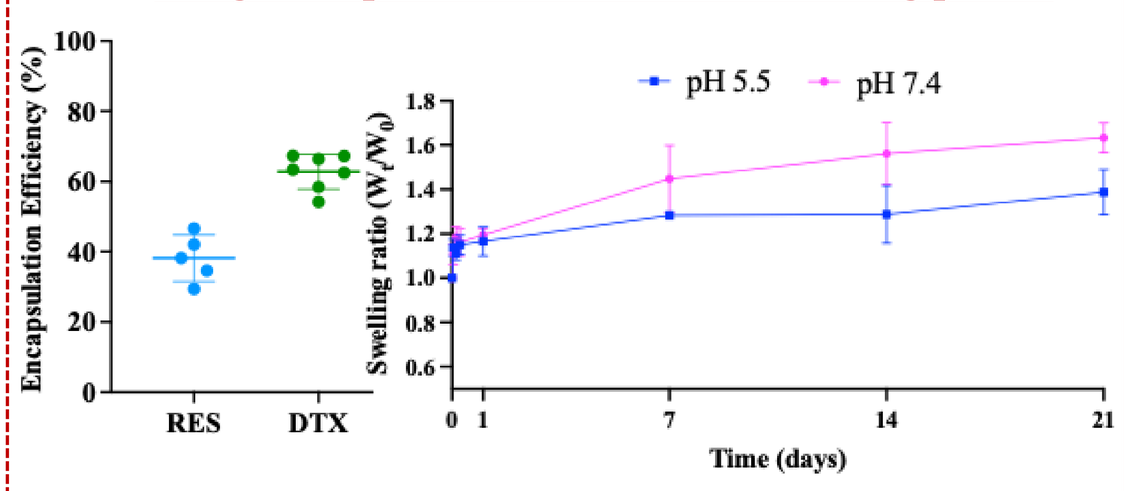


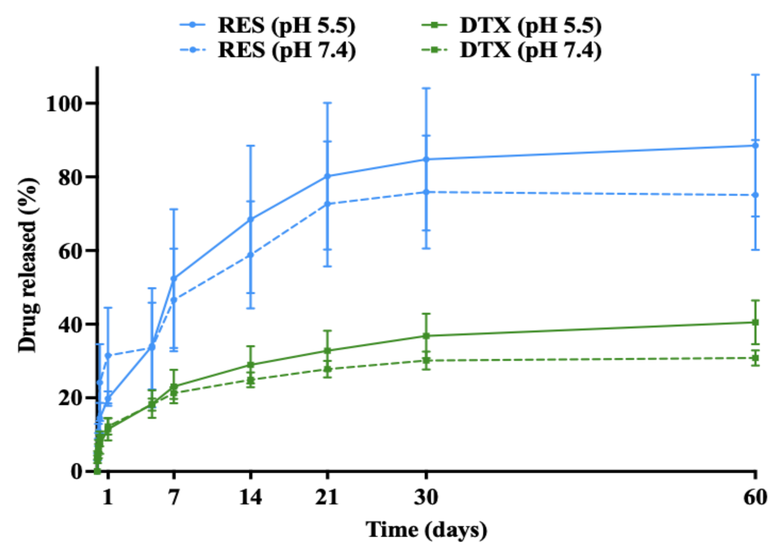




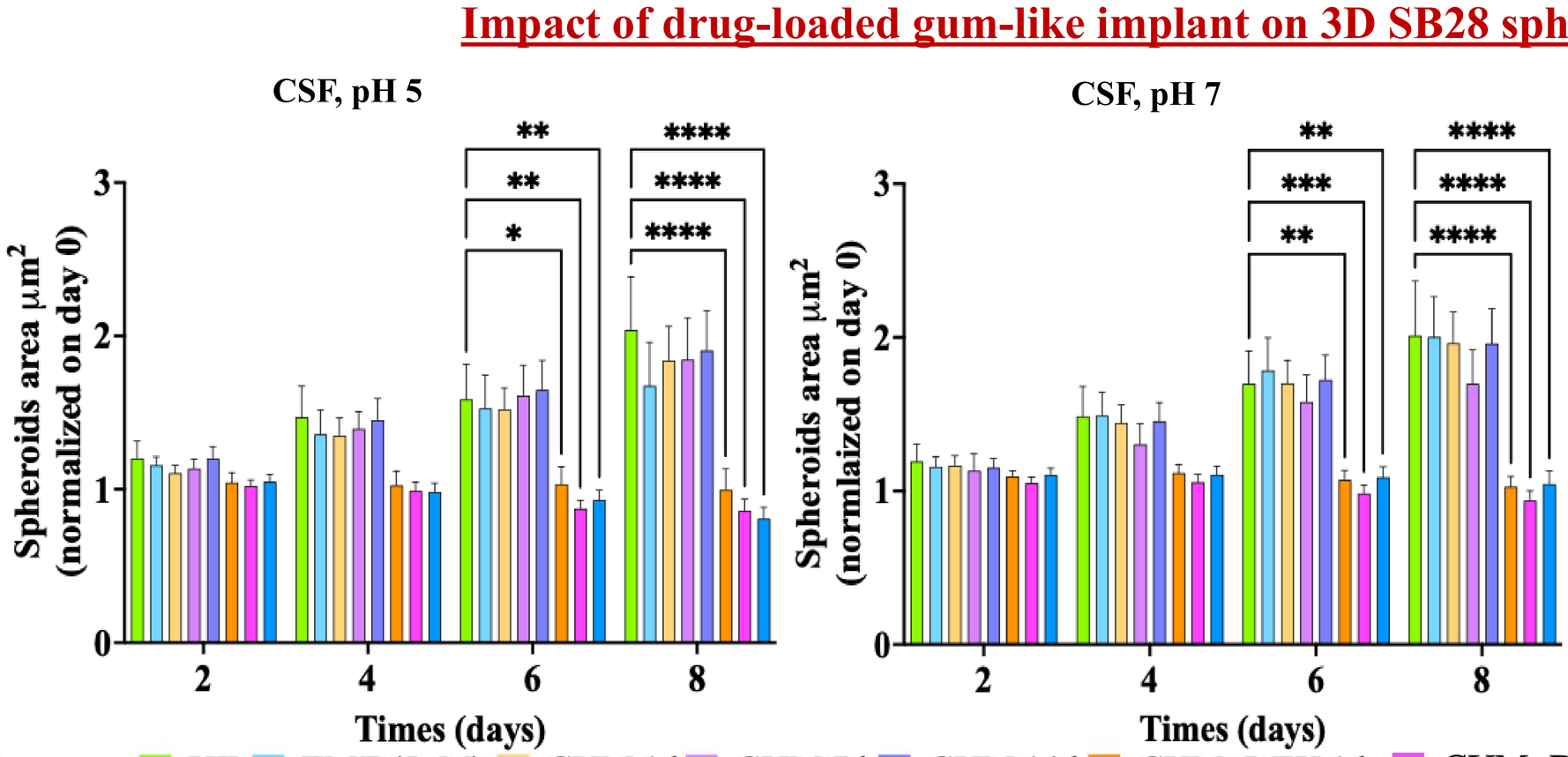


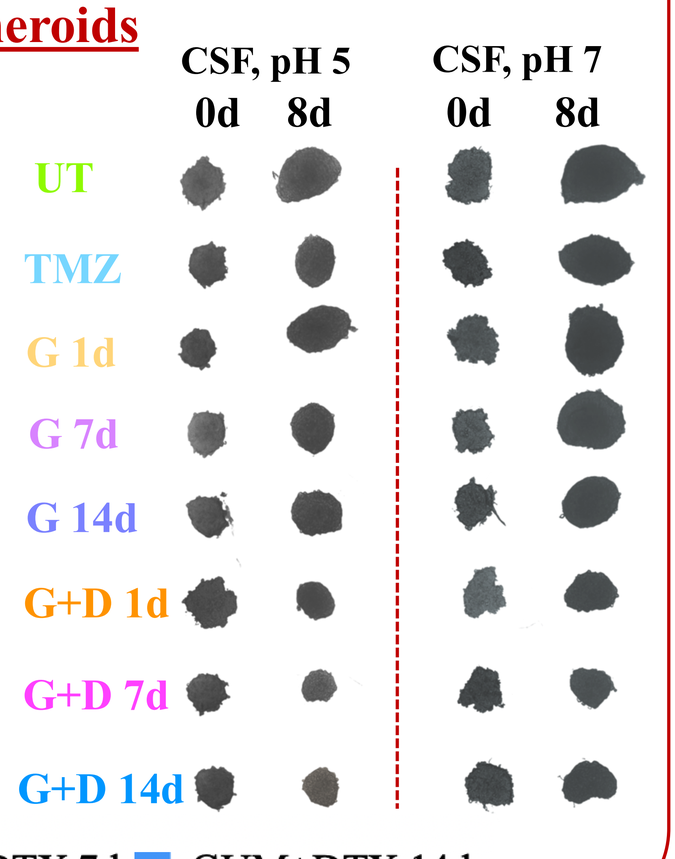
Drugs encapsulation, release and swelling profile





Impact of drug-loaded gum-like implant on 3D SB28 spheroids





Conclusions

The developed gum-like implant represents a promising local drug-delivery platform for post-resection GBM, combining sustained drug release with enhanced cytotoxicity against SB28 spheroids compared with TMZ. Additional in vivo studies are required to evaluate therapeutic efficacy.

References

[1] G. Rodella, et al. Localized delivery of hyaluronic acid-doxorubicin from a surgical paste for post-operative glioblastoma treatment, Materials Today Bio, (2026) 103142. [2] T. Kisby, et al. Targeting the glioblastoma resection margin with locoregional nanotechnologies, Nature Reviews Clinical Oncology, 22 (2025) 517-537. [3] C. Bastiancich, et al. Rationally designed drug delivery systems for the local treatment of resected glioblastoma, Advanced Drug Delivery Reviews, (2021) 113951.

Acknowledgments

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