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Oncolytic viral therapy with gravity approaching zero to ameliorate glioblastoma multiforme

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INTRODUCTION & AIM

Glioblastoma multiforme (GBM) (Ostrom, *et al.*, 2022)

- Most common malignant primary brain tumor
- Afflictis 3 in every 100,000 persons in the United States
- Arises from the neural and/or glial progenitor/stem cells
- Frontal lobes
- 5-year survival rate of 6.9%

Promising experimental interventions

- Gene therapy
- Immune therapy
- Oncolytic viral therapy
- Simulated microgravity therapy

Potential beneficial effects of microgravity on GBM

- Blocking of spherical colony formation and cellular proliferation
- Expression of survival signaling pathways
- Induction of the apoptosis of cancerous cells

Aim: To assess the effect of oncolytic viral therapy on glioblastoma multiforme when the gravity approaches zero.

METHOD

Glioblastoma multiforme cells

● Autonomous rat parvovirus H1 (Elshourbagy and Brasic, 2023; Galanis, 2010; Kaufman, *et al.,* 2015;)

● Gravity approaching zero (Ahn, *et al.,* 2019; Arun, *et al.,* 2019; Svejgaard, *et al.,* 2015; Takeda, *et al.,* 2009) in space (Johnson, *et al.*, 2022)

RESULTS & DISCUSSION

Testing our proposal on an exploration spaceflight (Blue, *et al.*, 2019) may provide the bases for a breakthrough in the treatment of GBM.

CONCLUSION

Our proposal to subject GBM cells to oncolytic viral therapy on a spaceflight with gravity approaching zero may provide the tools to ameliorate GBM.

FUTURE WORK / REFERENCES

Ahn CB, Lee J-H, Han DG, Kang H-W, Lee S-H, Lee J-I, Son KH, Lee JW. Simulated microgravity with floating environment promotes migration of non-small cell lung cancers. Sci. Rep. 2019; 9(1): 14553. https://doi.org/10.1038/s41598-019-50736-6

Arun RP, Sivanesan D, Patra B, Varadaraj S, Verma RS. Simulated microgravity increases polyploid giant cancer cells and nuclear localization of YAP. Sci. Rep. 2019;9(1): 10684. https://doi.org/10.1038/s41598-019-47116-5

Blue RS, Bayuse TM, Daniels VR, Wotring VE, Suresh R, Mulcahy RA, Antonsen EL. Supplying a pharmacy for NASA exploration spaceflight:challenges and current understanding. NPJ Microgravity 2019; 5:14. https://doi.org/10.1038/s41526-019-0075-2

Elshourbagy T, Bražić JR. Amelioration of glioblastoma multiforme via the combination of simulated microgravity and oncolytic viral therapy. Med. Sci. Forum. 2023; 20: 9. https://doi.org/10.3390/IECC2023-14219

Galanis E. Therapeutic potential of oncolytic measles virus: promises and challenges. Clin. Pharmacol. Ther. 2010; 88(5): 620-625. https://doi.org/10.1038/clpt.2010.211

Johnson KVL, Michael AP, Saehle T. Central nervous system neoplasms in microgravity. A. P. Michael et al. (eds.), Spaceflight and the Central Nervous System, In: Michael AP, Otto C, Reschke MF, Hargens AR. (eds) Spaceflight and the Central Nervous System. Springer, Cham. 2022: 107-121. https://doi.org/10.1007/978-3-031-18440-6_8

Kaufman HL, Kohlhapp FJ, Zloza A. Oncolytic viruses: a new class of immunotherapy drugs. doi:10.1038/nrd4663. 2015; 14: 642-662. https://doi.org/10.1038/nrd4663

Ostrom QT, Price M, Neff C, Cioffi G, Waite KA, Kruchko C. Barnholtz-Sloan JS. CBTRUS statistical report: Primary brain and other central nervous system tumors diagnosed in the United States in 2015–2019. Neuro. Oncol. 2022; 24 (Suppl. S5: v1–v95.

Svejgaard B, Wehland M, Ma X, Kopp S, Sahana J, Warnke E, Aleshcheva G, Hemmersbach R, Hauslage J, Grosse J, Bauer J, Corydon TJ, Islam T, Infanger M, Grimm D. Common effects on cancer cells exerted by a random positioning machine and a 2D clinostat. PLoS One. 2015;10(8): e0135157. https://doi.org/10.1371/journal.pone.0135157

Takeda M, Magaki T, Okazaki T, Kawahara Y, Manabe T, Yuge L, Kurisu K. Effects of, simulated microgravity on proliferation and chemosensitivity in malignant glioma cells. Neurosci. Lett. 2009; 463: 54–59.

Topal U, Zamur C. Microgravity, stem cells, and cancer: a new hope for cancer treatment. Stem Cells Int 2021; 2021: 5566872. https://doi.org/10.1155/2021/5566872