Exploring anti-metastatic potential of Sutent on U87 cells via computational and experimental analyses (Research Paper)

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Introduction: Glioblastoma multiforme (GBM) is the most aggressive and infiltrative form of brain tumor. While standard treatment typically involves surgical resection, followed by radiotherapy and chemotherapy, patient survival rates remain low. The poor prognosis associated with GBM is largely due to metastasis, as both local and distant invasions result in tumor recurrence, even after intensive treatment. The objective of current research was to determine whether Sutent has the potential to reduce the metastatic potential of GBM cells in silico and in vitro.

Methods: For computational analysis, potential molecular targets of Sutent and pathogenic targets of GBM were identified and Venn diagram was created to illustrate their overlap. Then, protein-protein interaction network was constructed, and enrichment analysis was performed. For in vitro studies, U87 cells were cultured in 24-well plates, and once a cell monolayer was established, a vertical scratch was introduced. Then, cells were treated with 12.5 µM Sutent, while untreated cells and those treated with DMSO solvent served as controls. Four microscopic fields were subsequently selected to observe the migration of U87 cells over a 24 h period.

Results: Seventy six overlapping targets were detected for Sutent and GBM, and CytoHubba plugin identified SRC, JAK2, and EGFR as top hub genes, which are known to be involved in cell migration and invasion processes. Enrichment analysis also confirmed the involvement of hub genes in several biological processes and pathways. Results of migration assay showed that the migration of untreated cells and those treated with DMSO after 24 h was 98.2% and 98.5%, respectively. Notably, treatment with Sutent significantly ($p<0.001$) reduced cell migration to 13.7%.

Conclusion: The study findings suggest that Sutent has significant potential to reduce the metastatic capabilities of GBM cells, supporting its further investigation as a therapeutic agent.

Keywords: Metastasis, Glioblastoma multiforme, Sutent, Migration assay.