Glioblastoma: Imaging Genomic Mapping Reveals Sex-specific Oncogenic Associations of Cell Death (Glioblastoma-Genomic-Mapping)

Description

PURPOSE:

To identify the molecular profiles of cell death as defined by MRI necrosis volumes and uncover gender-specific molecular signatures potentially driving oncogenesis and cell death in glioblastoma.

MATERIALS AND METHODS:

This retrospective study was HIPAA compliant, institutionally review board approved and informed consent was waived. We identified the molecular profiles of 99 patients (female 30, male 69) from The Cancer Genome Atlas (TCGA) with quantitative MR-imaging data were obtained from The Cancer Imaging Archive (TCIA). Volumes of necrosis on MRI were extracted. Differential gene expression profiles were obtained in those patients, including males and females separately, with high versus low MR volumes of tumor necrosis. Ingenuity pathway analysis and MirWalk were used for mRNA-microRNA interaction analysis. Our histopathology dataset (N= 368; female 144, males 224) was used to validate the MRI findings by assessing the amount of cell death. Connectivity map was used identify therapeutics with potential to target gender specific cell death in glioblastoma.

RESULTS:

Female patients demonstrated significantly lower volumes of necrosis on MRI compared to males (6,821 versus 11,050 mm3; P=0.03). Female patients, unlike males, with high volumes of necrosis on imaging had significantly shorter survival (6.5 versus 14.5 months, P=0.01). Transcription factor analysis suggested that cell death in female GBM patients is associated with MYC, while that in male is associated with TP53 activity. Additionally, we identify group of therapeutics that can potentially be tested to target cell death in gender specific manner.

CONCLUSIONS:

Our results suggest that GBM cell death may be driven by gender-specific molecular pathways.

Data Access

Data Access

Collections Used in this Third Party Analysis

Below is a list of the Collections used in these analyses:

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Data Citation

Colen, R. R., Wang, J., Singh, S., Gutman, D. A., & Zinn, P. O. (2014). **Imaging Genomic Mapping Reveals Gender-Specific Oncogenic Associations of Cell Death in Glioblastoma (Glioblastoma-Genomic-Mapping)[Data set].** The Cancer Imaging Archive. https://doi.org/10.7937/K9/TCIA.2014.WIJJJPLM

Publication Citation

Colen, R. R., Wang, J., Singh, S. K., Gutman, D. A., & Zinn, P. O. (2015). **Glioblastoma: Imaging Genomic Mapping Reveals Sex-specific Oncogenic Associations of Cell Death**. In Radiology (Vol. 275, Issue 1, pp. 215–227). Radiological Society of North America (RSNA). https://doi.org/10.1148/radiol.14141800 PMID: 25490189

TCIA Citation

Clark, K., Vendt, B., Smith, K., Freymann, J., Kirby, J., Koppel, P., Moore, S., Phillips, S., Maffitt, D., Pringle, M., Tarbox, L., & Prior, F. (2013). **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository.** In Journal of Digital Imaging (Vol. 26, Issue 6, pp. 1045–1057). Springer Science and Business Media LLC. https://doi.org/10.1007/s10278-013-9622-7 PMCID: PMC3824915

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