Spatial Habitat Features derived from Multiparametric Magnetic Resonance Imaging data from Glioblastoma Multiforme cases

Description

One of the most common and aggressive malignant brain tumors is Glioblastoma multiforme. Despite the multimodality treatment such as radiation therapy and chemotherapy (temozolomide: TMZ), the median survival rate of glioblastoma patient is less than 15 months. In this study, we investigated the association between measures of spatial diversity derived from spatial point pattern analysis of multiparametric magnetic resonance imaging (MRI) data with molecular status as well as 12-month survival in glioblastoma. We obtained 27 measures of spatial proximity (diversity) via spatial point pattern analysis of multiparametric T1 post-contrast and T2 fluid-attenuated inversion recovery MRI data. These measures were used to predict 12-month survival status (12 or >12 months) in 74 glioblastoma patients. Kaplan-Meier with receiver operating characteristic analyses was used to assess the relationship between derived spatial features and 12-month survival status as well as molecular subtype status in patients with glioblastoma. Kaplan-Meier survival analysis revealed that 14 spatial features were capable of stratifying overall survival in a statistically significant manner. For prediction of 12-month survival status based on these diversity indices, sensitivity and specificity were 0.86 and 0.64, respectively. The area under the receiver operating characteristic curve and the accuracy were 0.76 and 0.75, respectively. For prediction of molecular subtype status, proneural subtype shows highest accuracy of 0.93 among all molecular subtypes based on receiver operating characteristic analysis. We find that measures of spatial diversity from point pattern analysis of intensity habitats from T1 post-contrast and T2 fluid-attenuated inversion recovery images are associated with both tumor subtype status and 12-month survival status and may therefore be useful indicators of patient prognosis, in addition to providing potential guidance for molecularly-targeted therapies in Glioblastoma multiforme.

This dataset pertains to 74 cases from the TCGA-GBM dataset on which spatial pattern analysis was performed in our publication.

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Lee, Joonsang, Narang, Shivali, Martinez, Juan, Rao, Ganesh, & Rao, Arvind. (2015). **Spatial Habitat Features derived from Multiparametric Magnetic Resonance Imaging data from Glioblastoma Multiforme cases**. The Cancer Imaging Archive. https://doi.org/10.7937/K9/TCIA.2015.3BPe5wRq

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