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Genomic medicine advances for brain tumors

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Abstract

Cancer genome profiling has revealed important genetic alterations that serve as prognostic indicators and guides for treatment decisions, enabling precision medicine. The shift to molecular diagnosis of brain tumors, as reflected in the 2021 World Health Organization Classification of Tumors of the Central Nervous System, is a crucial role for treatment decision-making. This review discusses the significance and role of cancer genome profiling in precision medicine for malignant brain tumors, particularly gliomas. Furthermore, we explore the progress in cancer genome analysis, focusing on cancer gene panel testing, integration of genomic information in brain tumor classification, and hereditary tumors. Additionally, we discuss the transformative effect of genomic medicine on early detection, risk assessment, and precision medicine strategies. The tumor mutational burden in brain tumors is considered low, but the application of molecular targeted drugs, such as isocitrate dehydrogenase inhibitors, v-raf murine sarcoma viral oncogene homolog B1 inhibitors, fibroblast growth factor receptor inhibitors, neurotrophic tyrosine receptor kinase, mechanistic target of rapamycin inhibitors, and anti-programmed death receptor-1 antibody drugs are promising for glioma treatment. We also discuss the future prospects of molecular targeted drugs.

Keywords: Cancer genome profiling; Cancer multi-gene panel testing; Genomic abnormality; Molecular targeted drug; Precision medicine.