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Precision radiotherapy with molecular-profiling of CNS tumours

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Abstract

Diagnoses of CNS malignancies in the primary and metastatic setting have significantly advanced in the last decade with the advent of molecular pathology. Using a combination of immunohistochemistry, next-generation sequencing, and methylation profiling integrated with traditional histopathology, patient prognosis and disease characteristics can be understood to a much greater extent. This has recently manifested in predicting response to targeted drug therapies that are redefining management practices of CNS tumours. Radiotherapy, along with surgery, still remains an integral part of treating the majority of CNS tumours. However, the rapid advances in CNS molecular diagnostics have not yet been effectively translated into improving CNS radiotherapy. We explore several promising strategies under development to integrate molecular oncology into radiotherapy, and explore future directions that can serve to use molecular diagnostics to personalize radiotherapy. Evolving the management of CNS tumours with molecular profiling will be integral to supporting the future of precision radiotherapy.

Keywords: Brain tumour; CNS malignancies; Image-guided radiotherapy; Molecular pathology; Personalized medicine; Radiotherapy.