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Translating the theranostic concept to neuro-oncology: disrupting barriers

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Abstract

Theranostics integrate molecular imaging and targeted radionuclide therapy for personalised cancer therapy. Theranostic treatments have shown meaningful efficacy in randomised clinical trials and are approved for clinical use in prostate cancer and neuroendocrine tumours. Brain tumours represent an unmet clinical need and theranostics might offer effective treatment options, although specific issues need to be considered for clinical development. In this Policy Review, we discuss opportunities and challenges of developing targeted radionuclide therapies for the treatment of brain tumours including glioma, meningioma, and brain metastasis. The rational choice of molecular treatment targets is highlighted, including the potential relevance of different types of targeted radionuclide therapeutics, and the role of the blood-brain barrier and blood-tumour barrier. Furthermore, we discuss considerations for effective clinical trial design and conduct, as well as logistical and regulatory challenges for implementation of radionuclide therapies into neuro-oncological practice. Rational development will foster successful translation of the theranostic concept to brain tumours.

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