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## Mesenchymal stem cells as therapeutic vehicles for glioma

Tomoya Oishi<sup>1</sup>, Shinichiro Koizumi<sup>1</sup>, Kazuhiko Kurozumi<sup>2</sup>

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## Abstract

Glioma is a disease with a poor prognosis despite the availability of multimodality treatments, and the development of novel therapies is urgently needed. Challenges in glioma treatment include the difficulty for drugs to cross the blood-brain barrier when administered systemically and poor drug diffusion when administered locally. Mesenchymal stem cells exhibit advantages for glioma therapy because of their ability to pass through the blood-brain barrier and migrate to tumor cells and their tolerance to the immune system. Therefore, mesenchymal stem cells have been explored as vehicles for various therapeutic agents for glioma treatment. Mesenchymal stem cells loaded with chemotherapeutic drugs show improved penetration and tumor accumulation. For gene therapy, mesenchymal stem cells can be used as vehicles for suicide genes, the so-called gene-directed enzyme prodrug therapy. Mesenchymal stem cell-based oncolytic viral therapies have been attempted in recent years to enhance the efficacy of infection against the tumor, viral replication, and distribution of viral particles. Many uncertainties remain regarding the function and behavior of mesenchymal stem cells in gliomas. However, strategies to increase mesenchymal stem cell migration to gliomas may improve the delivery of therapeutic agents and enhance their anti-tumor effects, representing promising potential for patient treatment.

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