Contribution of microRNAs to radio- and chemoresistance of brain tumors and their therapeutic potential.

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Abstract
Glioblastomas, particularly high grade brain tumors such as glioblastoma multiforme, are characterized by increased anaplasia, malignancy, proliferation, and invasion. These tumors exhibit high resistance to radiation therapy and treatment with anti-cancer drugs. The radio- and chemoresistance of gliomas is attributed to cancer stem cells (CSCs) that are considered as major contributors for maintenance and propagation of tumor cell mass, cancer malignancy and invasiveness, and tumor cell survival after courses of radiotherapy and medical interventions. MicroRNAs (miRNAs), key post-transcriptional gene regulators, have altered expression profiles in gliomas. Some of miRNAs whose expression is markedly up-regulated in brain tumors are likely to have a pro-oncogenic role through supporting growth, proliferation, migration, and survival of cancer stem and non-stem cells. In contrast, a population of miRNA possessing anti-tumor effects is suppressed in gliomas. In this review, we will consider miRNAs and their influence on radio- and chemoresistance of gliomas. These miRNAs harbor a great therapeutic significance as potent agents in future targeted anti-cancer therapy to sensitize glioma tumor cells and CSCs to cytotoxic effects of radiation exposure and treatment with anti-cancer drugs.

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