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Commentary

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Problems of Effective Therapy of Brain Neoplasms: Fatality or Positive Outlook

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Introduction

The search for "mesenchymal stem cells, glioma, and treatment" showed 446 articles in PubMed on December 18, 2019. The results of scientific research presented in articles by professionals on oncological topics focus on the problem of malignancy of brain tumors and early detection of neoplasms in brain. The degree of glioblastoma's (GB) malignancy is determined by the content of cancer stem cells, identification of transcription factors, for example, OLIG2, cyclin D2 (CCND2) [1]. The complexity of therapy in glioblastomas is largely determined by tumor heterogeneity and insoluble problem of complete removal of tumor cells during surgery. These facts are the basis for accurate identification of cells in GB by sequencing in order to personalize combined therapy and increase effectiveness of antitumor therapy. Unfortunately, the effectiveness of gliomas' treatment and, especially treatment of grade IV glioblastoma, is premature to state, given the statistics of mortality from this pathology [1-3]. New innovative solutions are needed in this field of oncology. Positive results of cell therapy of brain tumors in experimental and clinical conditions are among these solutions. Articles have been published that contain analyses of the studies of authors who introduced umbilical cord mesenchymal stem cells (MSCs) into GB tissue and observed inhibition of GB cell growth and development [3]. MicroRNA molecules released from Extracellular Vesicles of umbilical cord MSCs are considered to be the proposed mechanism of such therapeutic effect [3]. Therefore, data are accumulating on the functional role of exosomes in oncological topics and the reality of MSCs use as one of the components in the treatment of GB [3-5].

It is advisable to pay attention to the problem of tumor tissue heterogeneity. Any tumor tissue includes both different populations of cancer cells and a variety of stromal cells [4]. Intercellular matrix contains many immunocompetent cells and MSCs that exhibit an immunosuppressive effect and are capable of either inhibiting or supporting tumor progression [4]. Given the limit of therapeutic options in GB therapy, scientists see MSCs as one of the tools for cell therapy, for example, the vector delivery of chemotherapy drugs, kinins and other antitumor substances for adjuvant or other antitumor therapy of GB [4, 5]. MSCs-based therapy is focused on the ability of tumor selection and is considered an effective antitumor variant of cell technologies.

Once again, GB is the most aggressive primary brain tumor in adults. The aggressive nature of GB is explained by the presence of cancer stem cells (CSC) in stroma, which control oncogenesis and are believed to be the trigger of the disease. It has been suggested that circulating tumor stem cells (CTSCs) contribute to the development of local and long-term relapses of GB [6]. It is difficult to successfully treat GB without understanding the pathogenesis of this pathological phenomenon. In this regard, "ideal" in vitro models are a promising method for studying the resistance of GB cells to therapy. The 3D GB model created by bioprinter [7] is one of such promising models as well as original possibilities of bioprinting and cell therapy [8-10]. Methods to increase the effectiveness of existing techniques of antitumor therapy, including those aimed at increasing the effectiveness of chemotherapy, should not be discounted [11-13].

Therefore, it is advisable to carefully update traditional methods of classical therapy of neoplasms with modern techniques. The existing problem of peculiar fatality for a person with a diagnosis of malignant neoplasm must be reversed combining the efforts of oncologists with professionals in the field of cell technologies, immunology, molecular biology, genetics, bioinformatics.

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