Tumor dormancy

The clinical manifestations of human glioma are known to be diverse, ranging from aggressive growth and invasion to apparent dormancy; however, the molecular mechanism underlying this diversity has been largely unexplored [1)].

Tumor dormancy is one of the stages in tumor development without clinical symptoms. Tumor dormant cells may appear in early stages of tumor development, as well as in micrometastasis and minimal residual disease. The mechanism for the switch of dormant cells between quiescent and proliferative stages is still largely unknown. Potential mechanisms that may account for the transition between dormant tumor cells and proliferative cells include angiogenesis, immune response, cellular factors, and signaling pathways. The clinical and therapeutic importance of dormant cells requires further studies to provide therapeutic strategies for inhibition of metastasis and tumor recurrence [2)].

Delineation of the guidance mechanisms and elements that influence cancer cell motility and dormancy are important for the advancement of treatment modalities aimed at the remediation of this devastating disease [3)]

The growth inhibition of remote metastases by a primary tumor is known as endogenous growth inhibition leading to tumor dormancy. Such a phenotype has not been described in primary malignant gliomas. However, although glioma cells have frequently spread to other parts of the brain at the time of diagnosis, formation of solid secondary tumors is uncommon [4)].

The characteristics of signet ring cell carcinoma (SRC) and the process of “tumor dormancy” may have been involved in the mechanism underlying late metastasis [5)].

A case is very unique in that ganglioneuroma matured from ganglioneuroblastoma or neuroblastoma had the late recurrence with 21 years of tumor dormancy [6)].

A 26-year-old male presented with a rare cerebellar pilocytic astrocytoma with multicompartmental subarachnoid metastases. Cerebrospinal fluid dissemination of low grade astrocytoma at presentation is rare in adults. In the present patient, clinical and neuroradiological follow-up at 4 years, without adjuvant treatment, revealed non progression of tumors. The occurrence of benign dormancy, low grade tumor histology and multifocal involvement of the neuraxis is rare. Close clinical observation is the best approach for management of such a patient [7)].

A study demonstrates the potential efficacy of intramuscular delivery of antiangiogenic gene for treatment of metastatic brain tumor [8)].

A report describes the spontaneous involution of an intrinsic brain stem lesion whose clinical and MRI characteristics strongly suggest a tumor etiology. Nonoperative experiences with central nervous system tumors have shown that they may sometimes exhibit prolonged periods of dormancy. There are several reports of 'disappearing' CT lesions which have all been inflammatory, infective, or immunological. No histologically proven tumor has been shown to spontaneously involute, nor have 'disappearing' lesions been described for MRI [9)].

References

1)

Fuse T, Tanikawa M, Nakanishi M, Ikeda K, Tada T, Inagaki H, Asai K, Kato T, Yamada K. p27Kip1

expression by contact inhibition as a prognostic index of human glioma. J Neurochem. 2000 Apr;74(4):1393-9. PubMed PMID: 10737594.
2)
Li J, Jiang E, Wang X, Shangguan AJ, Zhang L, Yu Z. Dormant Cells: The Original Cause of Tumor Recurrence and Metastasis. Cell Biochem Biophys. 2015 Jan 3. [Epub ahead of print] PubMed PMID: 25556072.
3)
Santarelli JG, Sarkissian V, Hou LC, Veeravagu A, Tse V. Molecular events of brain metastasis. Neurosurg Focus. 2007 Mar 15;22(3):E1. Review. PubMed PMID: 17608351.
4)
Kirsch M, Allende R, Black P, Schackert G. Endogenous growth inhibition of angiogenesis in brain tumors. Cancer Metastasis Rev. 2007 Dec;26(3-4):469-79. PubMed PMID: 17960325.
5)
Fukushima M, Katayama Y, Shigemori Y, Miyake H, Hirayama T, Kotani A. Clivus metastasis from gastric signet ring cell carcinoma after a 10-year disease-free interval–case report. Neurol Med Chir (Tokyo). 2012;52(10):751-3. PubMed PMID: 23095270.
6)
Okita Y, Narita Y, Yoshida A, Miyakita Y, Ohno M, Saio M, Yoshimi N, Shibui S. The late recurrence of ganglioneuroma 21 years after initial presentation with neuroblastoma. Pediatr Hematol Oncol. 2012 Oct;29(7):647-51. Epub 2012 Sep 11. PubMed PMID: 22966943.
7)
Redhu R, Nadkarni TD. Multicompartmental cerebrospinal fluid dissemination of cerebellar pilocytic astrocytoma at presentation. J Clin Neurosci. 2011 Oct;18(10):1412-4. doi: 10.1016/j.jocn.2011.01.038. Epub 2011 Jul 20. PubMed PMID: 21764319.
8)
Oga M, Takenaga K, Sato Y, Nakajima H, Koshikawa N, Osato K, Sakiyama S. Inhibition of metastatic brain tumor growth by intramuscular administration of the endostatin gene. Int J Oncol. 2003 Jul;23(1):73-9. PubMed PMID: 12792778.
9)
Rao S, Constantini S, Gomori JM, Siegal T, Epstein F. Spontaneous involution of an intra-axial brain stem lesion: a case report. Pediatr Neurosurg. 1995;23(5):279-81; discussion 282. PubMed PMID: 8688354.