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Approaches to minimise the contribution of the tumour microenvironment and cancer stem cells in tumorigenesis

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Cancer stem cells (CSCs) or cancer initiating cells (CICs) are a subgroup of tumour cells which have the ability to regenerate and aid tumorigenicity. CSCs/CICs are usually resistant to chemotherapy and radiation therapy, thereby leading to disease recurrence and metastasis. The tumour microenvironment is said to play a crucial role in the dormancy or activation of these CSCs/CICs. There are several possible therapeutic approaches that can minimise or stop the contribution of the tumour microenvironment and CSCs/CICs in tumorigenesis. Cancer immunotherapy involving anti-cytotoxic T-lymphocyte-associated antigen 4 (CTLA4) and anti-programmed cell death protein 1 (PD1) work as T-cell inhibitory receptors. This is one method used for the treatment of metastatic melanoma patients. Antiangiogenic therapy is another way of targeting the tumour microenvironment. Studies have shown that the usage of bevacizumab, an antiangiogenic drug, along with chemotherapy or specific tumour inhibitors, can be a good therapeutic approach for treating glioblastoma (GBM). A particular study revealed that the dormancy of the cells was prolonged when the uveal melanoma cell lines were treated with a tumour inhibitor. Thus, this method could be effective in lengthening the dormant/quiescent stage of the cells. Further, metformin, a biguanides group of oral antihyperglycemic drugs, possess chemopreventive properties and has been studied to treat various cancers, such as breast cancer and glioblastoma. These methods should be further researched and should be optimised for treating CSCs/CICs and their microenvironment in order to employ them to prevent disease recurrence and metastasis.

Keywords: Tumour microenvironment, Cancer stem cells, Cancer initiating cells, Tumour inhibitors

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