

Journal Article



The postoperative brain tumour stem cell (BTSC) niche and cancer recurrence

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Abstract Currently, surgical resection is one of only a few options for treating brain cancer. Unfortunately, postoperative tumour recurrence remains almost inevitable despite additional radiation or chemotherapy treatment following resection. Clinical observations and a growing body of experimental evidence have led to speculation that there is a population of persistent brain tumour stem cells (BTSCs) — or brain tumour initiating cells — that are difficult to completely remove surgically. Furthermore, residual BTSCs following surgery may actually be more resistant to subsequent radiation and/or chemotherapies. It remains to be determined if brain surgeries render the postoperative tissue microenvironment more favourable for the survival and growth of BTSCs, and therefore the recurrence of brain tumours.

We hypothesise that BTSC-based tumour recurrence may develop within a specific niche of the aberrant tumour microenvironment. Even when the gross appearance of the primary tumour seems confined, BTSCs (albeit accounting only for a small population of tumour cells) may microscopically enter the stroma, hampering curative surgeries. This article discusses the theory that surgical resection of brain tumours generates niches recruiting BTSCs to the surgical wounds, stimulating the proliferation and invasiveness of BTSCs, and leading to tumour recurrence. Postoperative brains are marked with active wound repair in peritumoural margins, which is likely to be accompanied by increased inflammatory paracrine production, angiogenesis and reactive astrogliosis. The postoperative BTSC niche concept is consistent with the observation that brain tumour recurrence usually occurs in tissues that are proximal to

the resection margin. In this article, we intend to reflect recent advances that may lead to novel strategies to eliminate postoperative brain tumour recurrence.

Keywords extracellular matrix - neurovasculature - operative tissue injury - paracrine factors - recurrence - stem cell niche - surgery

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References secured to subscribers.

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