The Effect of Interaction with Neural Stem Cells on the Migration, Proliferation, and Proteome of GBM Cells

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Purpose: GBM (glioblastoma multiforme), a primary brain tumor, exhibits more invasive and malignant behavior when developed proximal to the subventricular zone (SVZ) of the brain. A unique feature of the SVZ, a neurogenic niche, is the presence of neural stem cells (NSCs), which are believed to be a possible cause of this increased malignancy in the SVZ. Methods: GBM cells and NSCs were cocultured for varying periods of time, either in direct physical contact or separated by a transwell insert, and then analyzed through qPCR and immunofluorescence for changes in behavior. The cocultured cells were compared with two control groups, one sample of single culture for both GBM cells and NSCs. Results: The NSCS showed a changed morphology after coculture, wrapping around the GBM cells and appearing to clump together like the GBM cells. The expression of OPN, the protein most directly connected to malignant behavior, also rose significantly in the GBM cells after coculture in both the transwell qPCR trial and immunofluorescence quantification. Conclusion: Both direct physical contact with NSCs and exchange of soluble factors promotes the malignant behavior of GBM cells in vitro. GBM cells have a reciprocal effect on NSCs, which change their morphology significantly once in contact with GBM cells, indicating that some internal change in their function or composition may be occurring. Inhibition of vital oncogenes in NSCs may more clearly illustrate their role in promoting malignancy and whether this harmful effect can be prevented with treatment, an important application of this primarily basic research.

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