Matrix stiffness

Matrix stiffness is a key physical characteristic of the tumor microenvironment and correlates tightly with tumor progression.

Tao et al. explored the association between matrix stiffness and glioma development. Using atomic force microscopy, we observed higher matrix stiffness in highly malignant glioma tissues than in low-grade/innocent tissues. In vitro and in vivo analyses revealed that culturing glioma cells on stiff polyacrylamide hydrogels enhanced their proliferation, tumorigenesis, and CD133 expression. Greater matrix stiffness could obviously up-regulate the expression of BCL9L, thereby promoting the activation of Wnt/beta-catenin signaling and ultimately increasing the stemness of glioma cells. Inhibiting Wnt/beta-catenin signaling using gigantol consistently improved the anticancer effects of chemotherapy and radiotherapy in mice with subcutaneous glioma tumors. These findings demonstrate that a stiffer matrix increases the stemness of glioma cells by activating BCL9L/Wnt/beta-catenin signaling. Moreover, they provided a potential strategy for clinical glioma treatment by demonstrating that gigantol can improve the effectiveness of traditional chemotherapy/radiotherapy by suppressing Wnt/beta-catenin signaling [1].

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Tao B, Song Y, Wu Y, Yang X, Peng T, Peng L, Xia K, Xia X, Chen L, Zhong C. Matrix stiffness promotes glioma cell stemness by activating BCL9L/Wnt/beta-catenin signaling. Aging (Albany NY). 2021 Feb 1;12. doi: 10.18632/aging.202449. Epub ahead of print. PMID: 33535177.