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Glioma and Extracellular Matrix, A Review on the Integrins as the Receptors of the Extracellular Matrix

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Abstract

The brain extracellular matrix is a complex structure. The invading tumors like gliomas would interact with the extracellular matrix. There are receptors in the extracellular matrix including Integrins. This brief review tries to point to some important notes about the extracellular matrix and Integrins as a group of receptors in the extracellular matrix which can play the important role in the pathogenesis of gliomas in the brain tissue.

Keywords: Integrins; Glioma; Extracellular Matrix; Receptors

The extracellular matrix of the brain as a complex structure composed of the neuronal and glial glycoproteins and proteoglycans which mostly is hyaluronic acid based. Glioma cells would invade the tissue of the brain with making interactions between the brain host cells and the extracellular matrix which is surrounding such cells and the invading cells. Glioma cells will bind to the components of the extracellular matrix and this binding would be done by receptors which are specific in their nature. Also by matrix components secretion, they will shape the extracellular matrix and also would modulate the extracellular matrix by some enzymes like glycosidases, proteases, sulfatases etc. This process will result in making an environment which would be permissive in its nature [1,2]. Integrins which form a group of dimeric trans-membrane receptors and have two subunits including alpha and beta are the most important receptors for the components of the extracellular matrix.

By joining to the adapter proteins, they will start the cascades of the intracellular signaling. Mechanocoupling which would be guided by extracellular matrix would be done by connecting the actin-based cytoskeleton with the molecules. Fibronectin, collagens, laminin, tenascins, vitronectin and thrombospondins are some examples of the ligands [3,4]. Alpha and Beta chains combination would determine the strength of binding and the specificity of the ligand. In the affected brain tissue by glioma cells, the upregulation of various integrins can be seen. αvβ5 and αvβ3 would be found on glioma cells. Also they can be found on the vessels. Glioblastoma multiforme cell invasion would mainly be derived by αvβ8 among others. Thy-1/CD90 cell adhesion molecule as one of the αvβ3 ligands would be expressed on neuronal and endothelial cells including lymphatic and vascular cells. Thy-1/CD90 by differentiating into the cells of the endothelium would result in tumor vasculatures generation. It will be placed in the endothelium and would be a marker in the gliomas for the stem cells of the cancer and can be a determiner for the presence of high-grade gliomas [5,6].

Conclusion

Understanding the basic mechanisms involved in the pathogenesis of gliomas would open new doors to find novel

treatment options for such invasive brain tumors. It is of great importance both in basic and clinical settings.

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