The Role of Human Leukocyte Antigen (HLA) in Glioblastoma Multiforme (GBM)

ABSTRACT

HUMAN LEUKOCYTE ANTIGEN (HLA) is crucial for the immune system to initiate and regulate immune responses against foreign targets such as cancerous cells. This innate defense system can be further enhanced through the use of immunotherapy treatments, which work by stimulating the patient's immune system to destroy cancerous cells. Understanding the role of HLAs helps better characterize and understand how GBM evades immune surveillance. The present study aimed to explore the expression patterns of HLA in glioblastoma multiforme (GBM) and determine if these expression patterns correlate with patient outcomes.

BACKGROUND

Glioblastoma multiforme (GBM) is widely known as the most aggressive form of brain cancer and has a substantially low overall survival rate. GBM multiforme constitutes a severe challenge to brain cancer treatment efforts. The majority of patients with GBM do not respond well to traditional treatments such as surgery, radiation, and chemotherapy. Since glioblastoma multiforme is a very aggressive grade IV tumor, it is a test for the limits of modern medical science.

METHOD

The methodology for this research involves utilizing a computational biologic approach by analyzing tumor-on-normal gene expression data of GBM multiforme cases and creating a database. Statistical analysis will be performed and a database will be formed in the database. GBM multiforme cases were analyzed for expression patterns and found to be significantly different from normal brain tissue.

RESULTS AND STATISTICS

The HLA genes showed the most discrepancies between the normal tissue control and the cancerous tumor tissue in glioblastoma multiforme. HLA-A and HLA-B had the T-test results in the reaction pattern analysis. For the expression of HLA-A and HLA-B, the discrepancies between the normal control and the tumor tissue for HLA-A is notably less than the discrepancy between the tumor and normal control tissue for HLA-B. It shows that the HLA-A gene expression level is due to tumor tissue control towards cancerous tissue based on the data collected. The function of HLA-A and HLA-B is to present foreign peptides to CTL cells, which means that there is a significant difference in expression patterns of HLA-A and HLA-B. The pattern of HLA-A, HLA-B, HLA-C, HLA-D, HLA-DR, HLA-DQ, and HLA-D3 in GBM multiforme is different from that of normal brain tissue. HLA is a group of genes that encode for proteins called human leukocyte antigen molecules. These molecules can be found on the cell surface of all human cells. The HLAs can vary in their expression patterns and can be at varying degrees. If a foreign peptide is detected by the immune system, it will activate the immune system to attack cancerous cells. This immunotherapy approach can also be referred to as CAR-T cell therapy.

FUTURE PERSPECTIVES

For the future, there is a multitude of pathways that this research could go. Exploring the other forms of gliomas further, or the other two classes of HLA could be a beneficial route to take into consideration. Other glioma tumor types such as HLA-A, HLA-B, HLA-C, HLA-D, HLA-DR, HLA-DQ, HLA-D3, and HLA-E, it is important to note that there is a large amount of data collected.