The Use of WT1-qPCR to Measure and Detect Minimal Residual Disease (MRD) in Acute Myeloid Leukemia (AML)

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Leukemia is the cancer of blood forming tissues. There is an abnormal growth and count in the blood, indicating an issue. Many patients relapse due to inefficient methods in detecting leukemia or minimal residual disease (MRD). MRD is a submicroscopic disease of the remaining leukemic cells during or after treatment. The ability to detect MRD has greatly increased the ability to quantify treatment response and the probability of relapse. There are several disease monitoring techniques for treating acute myeloid leukemia (AML). Quantitative polymerase chain reaction (qPCR) has been used the past 20 for the diagnosis of MRD in clinical settings. qPCR uses the amplification of DNA to determine quantities known as a sequence in a sample. qPCR should be able to detect leukemic cells by targeting Wilms Tumor1 (WT1) protein. WT1 is a protein highly expressed in leukemic blasts cells, serving as a marking in the detection of the disease.

The purpose of this project is to measure the efficiency of qPCR in detecting MRD. This project achieved this by targeting WT1 in the different ratios of cancerous cell to mononuclear cells (MNC). Researchers found qPCR was able to detect a leukemic cell in at least 1/100 cells and at most 1/100,000 cells.

A standard curve graph was created from the data and will be applicable in the future to compare to other means of detection, such as flow cytometry. The standard curve will also be used to estimate how many cancerous cells are in a patient's blood by comparing the ratios of cells in the body to the graph.

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