NOTCH1 Expression as an Early Method of Detection for Acute Myeloid Leukemia

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Question

Can alterations in the expression of NOTCH-1 be used as a biomarker for early detection in the beginning stages of Acute Myeloid Leukemia?

Abstract

Acute Myeloid Leukemia (AML), a form of cancer that affects the bone marrow and blood, has a low rate of survival. It kills many patients each year. This is primarily due because it has yet to be detected early on and therefore, makes the disease mature without the intervention of medical treatment. Early detection could increase the survival chances of patients with AML. We will be looking at NOTCH1, a protein coding gene, that has been linked to an association with early signs of AML. We will compare and contrast samples of AML cells and normal cells to see if NOTCH1 is expressed and the variation of the expression between the two types of samples. Western blotting is the main method we will use to detect NOTCH1 in both samples. If there is a biomarker that physicians can look for, such as the expression of NOTCH1, AML can be diagnosed in the earliest stage, and allow for treatment to be started sooner, which will then increase survival rate of patients.

Background

* A rapidly progressing disease where there are too many immature white blood cells within the blood and bone marrow
* NOTCH1 is a protein that is active during the early development of multicellular organisms
* Key to the development of many cells through the body
* Important because NOTCH1 signaling acts as a tumor suppressor and oncogenic role

Materials

Sample of a *normal* cell lysate , Samples of cells lysate with AML, Control , Antibodies Substrate, Polyacrylamide gels, Nitrocellulose membrane, Power unit, Bio-Rad mini wet transfer electrophoresis unit

Methods: Western Blot

This method has 7 standard steps which are:
1. Sample preparation
2. Gel electrophoresis
3. Blotting to membrane
4. Antibody probing
5. Detection
6. Imaging
7. Analysis
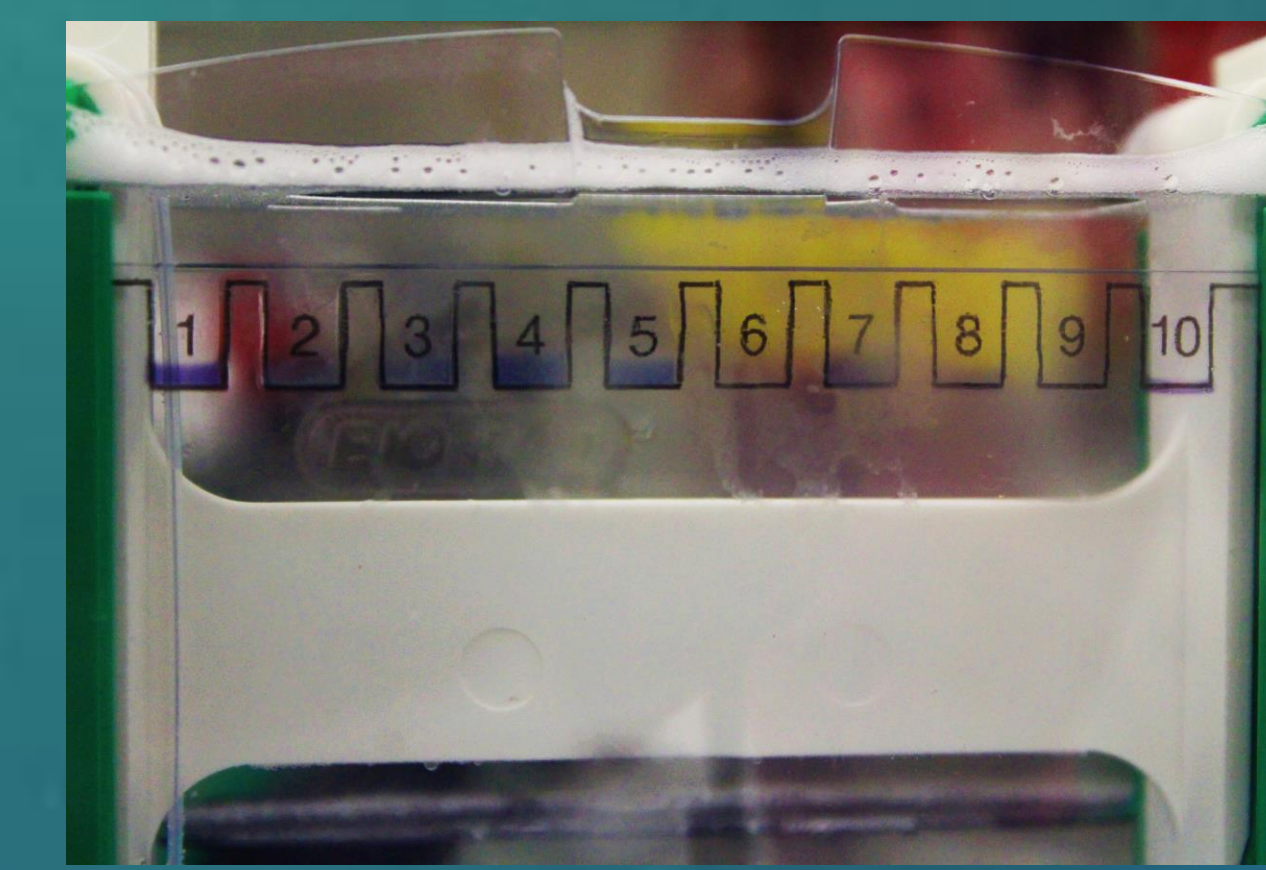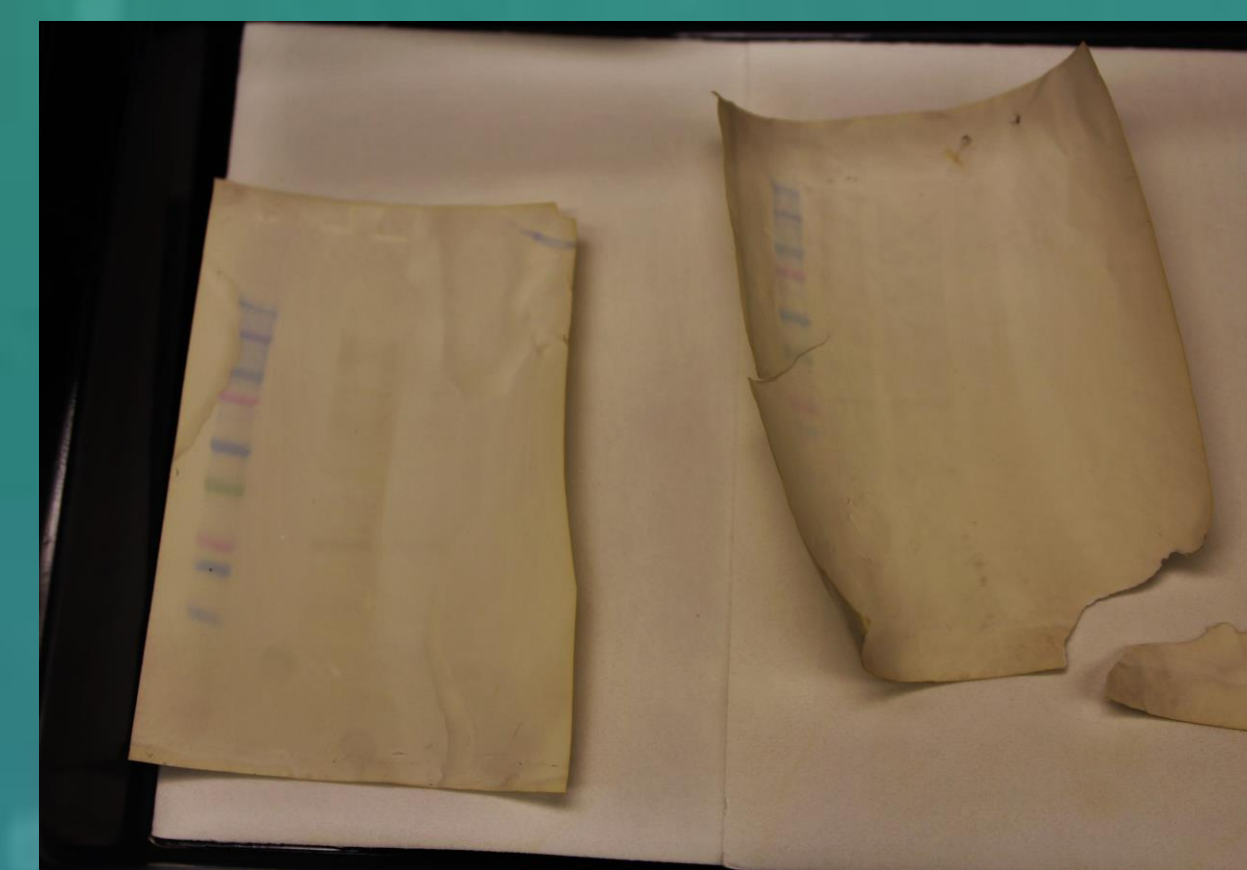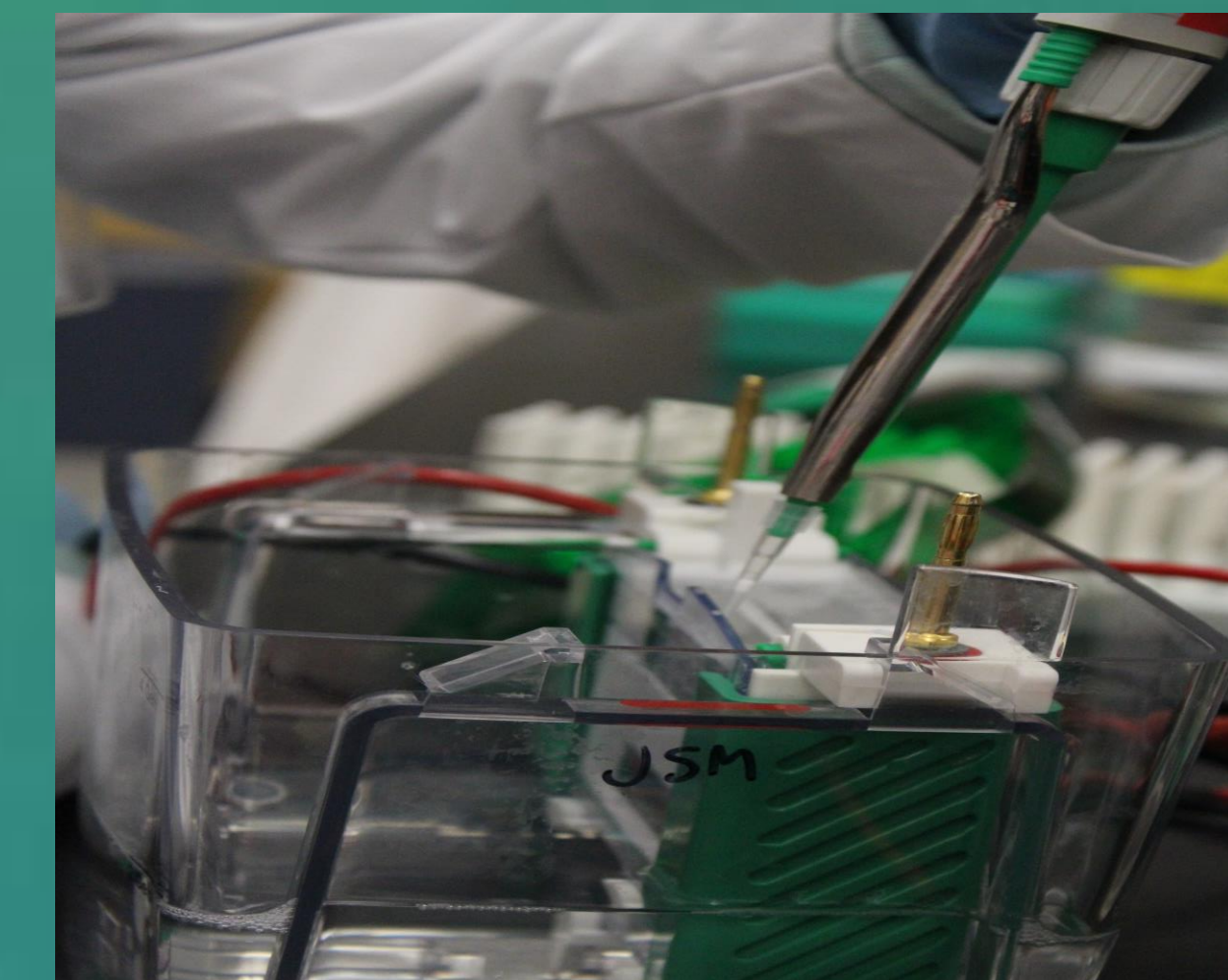
Conclusion/Results

Acute Myeloid Leukemia is a really difficult disease to treat because it's usually not detected until the symptoms appears, which is when the disease has overtaken many of the organs. Our project is about detecting this disease in the early stages by looking at the expression of NOTCH1 in both normal and AML cells. NOTCH1 has been discussed as a possible biomarker in literature that has resulted in further investigation of the role it can play as a biomarker to detect AML in the beginning stages. Through our experiment we can conclude, but not say with absolute certainty, that NOTCH1 can be a possible biomarker for early detection of Acute Myeloid Leukemia.

Future Significance

The data that will be collected in this project can be used in the following ways:
* Help scientist/doctors further understand or investigate further if NOTCH-1 is an acceptable candidate for a biomarker for early detection of AML.

Emendations

If we could change a few variables about our project, we would change the time. We feel that if we had had all the materials needed when the program began then time would not have been an issue within our project since we would have starter earlier by completing more than 3 rounds in order to see if the results are the same or if they differ. Also, if we could've had more samples we could have gone more into depth with our experiment since we would have different variables in the cells.

Acknowledgements

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