

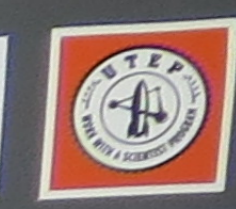


NOTCH-1 Expression as an Early Method of Detection for Acute Myeloid Leukemia

Mitali Bhakta¹, Shania Hickey¹, Rebecca Bossie¹, Katherine Kirtley¹ and Dr. Jacen S. Moore^{1,2}

¹UTEP Work With A Scientist Program,

²UTEP Department of Clinical Laboratory Sciences, El Paso, TX, USA



Abstract

Acute Myeloid Leukemia (AML) kills many of the patients diagnosed with the disease each year. The survival rate of people with AML in a five year period is only 26%, however, no doctor can pinpoint how long an AML patient will live [1]. Early detection could increase the survival chances of patients with AML. We will be looking at NOTCH-1 levels to see if it can be used as a biomarker of early AML because it is not usually detected until after it spreads to organs from the bone marrow. Western blotting is the main method we will use to detect NOTCH-1. If AML is diagnosed in the earliest stages, treatment can be started sooner and the survival rate of patients may be higher.

Question

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

Acute Myeloid Leukemia

- **Acute Myeloid Leukemia (AML) is:**
 - A rapidly progressing disease where there are too many immature white blood cells within the blood and bone marrow [1].
 - The most common type of acute leukemia that starts in the bone marrow [2-3].
 - Characterized by symptoms such as fatigue, reoccurring infections, and bruising easily [4]
- Depending on the stage, detection of early myeloid progenitor cells in the blood can be suggestive of infection or cancer [4].
- Abnormal myeloid cells can crowd out normal white blood cells, red blood cells and platelets that the body needs [2].
- Treatments used to treat AML are chemotherapy, drug therapy and occasionally stem cell transplants [4].
- The stages of leukemia are characterized by blood cell counts and accumulation of leukemic cells in other organs like liver or spleen [5].



NOTCH-1

- **NOTCH-1 is [6]:**
 - A protein active during early development of multicellular organisms
 - Required for the formation of basic structures in the growing embryo.
 - Key to the development of many cells throughout the body.
 - Important because NOTCH-1 signaling plays a tumor suppressor and oncogenic role.
- Problems within NOTCH-1 could potentially be an important biomarker for AML thus making it an excellent marker candidate to evaluate in Acute Myeloid Leukemia [7]

Methods and Materials

To detect the NOTCH-1 protein in Myeloid cells, proteins from samples will be separated using electrophoresis and NOTCH-1 detected using Western blotting. The procedure can be visualized below (Image obtained from www.sec.gov).

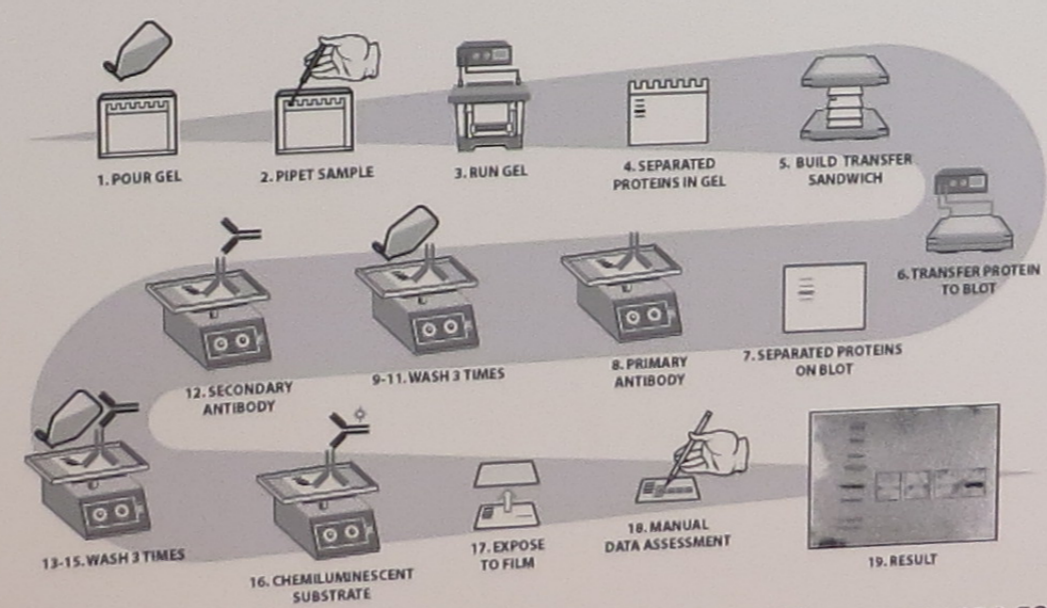


Image obtained from www.sec.gov

Expected Outcomes

We expect changes in the expression of NOTCH-1 in early AML as compared to later stages. We will also expect to see a difference in NOTCH-1 expression between healthy controls and AML patients.

Timeline

June 20 th – 24 th	June 27 th – July 1 st	July 5 th – 8 th	July 11 th – 15 th	July 18 th – 22 nd
Learn and perfect the western blotting method. Learn to identify NOTCH-1 proteins and differentiate from "normal" proteins.	Complete the 1 st round of western blotting on "normal" blood.	Complete the 2 nd round of western blotting, focusing on the NOTCH-1 protein expression. Analyze the results of the 1 st round.	Complete the 3 rd round of western blotting. Begin correlating the data between the different blood samples. Analyze the results of the 2 nd round.	Analyze the results of the 3 rd round as well as comparing all three results. Finalize findings and examine the overall product.

References

1. Definition of Acute myeloid leukemia. c1996-2016. MedicineNet <http://www.medicinenet.com/script/main/art.asp?articlekey=19297>
2. Leukemia types: Acute myeloid leukemia. c2016. Cancer Treatment Centers of America <http://www.cancercenter.com/leukemia/types/tab/acute-myeloid-leukemia/>
3. AML Facts: Acute Myeloid Leukemia Facts. c2004-2016. Seattle Cancer Care Alliance <http://www.seattlecca.org/diseases/adult-acute-myeloid-leukemia-facts.cfm>
4. Clinical Hematology and Fundamentals of Hemostasis FA Davis Gmpay, 5th Ed survival: a potential therapeutic approach. Journal of Experimental Medicine. 210(2). 321-327
5. Sankaranarayanan K. et al. 2013. NOTCH activation inhibits AML growth and survival: a potential therapeutic approach. Journal of Experimental Medicine. 210(2). 321-327

Acknowledgements

The authors would like to thank the Work with a Scientist Program, Dr. Pei-Ling Hsu, Paola Gama and Adriana Ortiz for their support and assistance. This project is sponsored by National Science Foundation, No. DRL-1322600