B-Cell Acute Lymphocytic Leukemia Minimum Residual Disease Detection by Flow Cytometry

B-cell lymphoblastic leukemia (B-LBL) is an aggressive leukemia of B-cell lineage involving immature lymphoid cells.[1] It is primarily a childhood disease.[1] B-LBL minimal residual disease (MRD) testing by flow cytometry may be useful for prognosis and monitoring of the disease and for the detection of MRD but should not be used for initial diagnosis. A comprehensive flow cytometry panel is preferred for initial diagnosis.

Featured ARUP Testing

B-Lymphoblastic Leukemia (B-ALL) Minimum Residual Disease Detection by Flow Cytometry 3000724

Method: Flow Cytometry

- Use to detect MRD in patients of all ages previously diagnosed with B-ALL.
- Available markers include CD3, CD9, CD10, CD13, CD19, CD20, CD33, CD34, CD38, CD45, CD58, CD71, Syto 16, CD66b, CD24, and CD22.
- Anti-CD19 resistant markers (CD10, CD19, CD20, CD22, CD24, CD34, CD38, CD45, CD58, CD66b) should be used unless the patient is a child and is on a Children's Oncology Group (COG) protocol.
- For information on initial diagnostic testing, refer to the Leukemia/Lymphoma Phenotyping Evaluation by Flow Cytometry Test Fact Sheet.

Test Description

This test is useful for the evaluation of MRD, specifically B-LBL blasts. Leukocytes are evaluated for the presence of immature/blast cells.

The reported markers vary based on whether the COG protocol is specified or not (this is typically not needed unless the patient is on a COG protocol). If the COG protocol is not required, an alternative 10-color panel that is resistant to anti-CD19 therapy (either monoclonal antibodies or CAR-T) is used and offers superior sensitivity in both these settings and in general.

Anti-CD19 Resistant Panel (Bone Marrow Only)

If the COG protocol is not specified (ie, if the patient is not on a COG protocol), the following markers will be performed and reported: CD10, CD19, CD20, CD22, CD24, CD34, CD38, CD45, CD58, CD66b

COG Protocol Panel

If COG protocol is specified, the time point and specimen type must be indicated. The markers reported in each scenario are listed below.

Day 8, peripheral blood: CD10, CD19, CD20, CD34, CD45, and Syto 16

Day 29, bone marrow: CD3, CD9, CD10, CD13, CD19, CD20, CD33, CD34, CD38, CD45, CD58, CD71, and Syto 16

Test Interpretation

Sensitivity/Specificity

Analytic Specificity

Discrimination by forward scatter, side scatter, CD45 intensity, and specific antigens

Analytic Sensitivity (Limit of Detection)

Anti-CD19 resistant panel (non-COG panel): 0.0072% of viable leukocytes

COG panel (poor sensitivity in patients treated with anti-CD19 CAR-T): 0.01% of nucleated mononuclear cells

Results

- Antigens will be reported as positive or negative.
- Positive results will be reported as a percentage of viable leukocytes or nucleated mononuclear cells.
- Pathologist interpretation of findings is included.

Limitations

- If the patient was treated with an anti-CD19 therapy, consider the non-COG panel.
- Poor cell viability may adversely affect antigens and impede the ability to properly identify neoplastic cells.
- Hemodilution or low numbers of events collected may affect sensitivity (first-pull aspirate is recommended for maximal sensitivity).
- Flow results should not be used alone to diagnose malignancy and should be interpreted in conjunction with morphology, clinical information, and other necessary ancillary tests for a definitive diagnosis.

References

1. National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Pediatric acute lymphoblastic leukemia. Version 2.2021. [Updated: Oct 2020; Accessed: Apr 2021]

Related Information

Acute Lymphoblastic Leukemia - ALL
Leukemia/Lymphoma Phenotyping Evaluation by Flow Cytometry

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