

# T-Cell Clonality by Flow Cytometry Analysis of TCR V-Beta

*FOR IDENTIFICATION OF MONOCLONAL T-CELL POPULATIONS THAT MAY BE NECESSARY FOR DIAGNOSIS OF MATURE T-CELL MALIGNANCIES*

## Clinical Background

- Detection of a monoclonal T-cell population is often necessary to diagnose T-cell malignancies, such as large granular lymphocytic leukemia or Sézary syndrome, among others. Traditionally, molecular analysis of the T-cell antigen receptor (TCR) loci by Southern blot or PCR had been used for detection of T-cell clonality. However, these methods can be time consuming and/or difficult to perform, do not target phenotypically defined T-cell populations that may be of interest in heterogeneous specimens, and are not good at quantifying the size of an identified clone.
- T-cell clonality testing by flow cytometry analysis involves using a large panel of monoclonal antibodies specific for different TCR variable region beta (Vβ) chains. With reactive polyclonal T-cell populations, only small numbers of T-cells react with any given antibody reflecting the diversity of different Vβ that are expressed. However, monoclonal T-cell populations express the same TCR and can be identified using flow cytometry by finding increased numbers of T-cells showing reactivity with one of the anti- Vβ antibodies (direct evidence) or near complete absence of reactivity with the panel (indirect evidence).

## Indications for Use

This test should be used when considering a diagnosis of T-cell malignancy and demonstration of a monoclonal T-cell population would be helpful. It is ideally suited for evaluating the possible clonality of T-cell populations with specific phenotypic features, since these can be analyzed separately from other T-cells that may be present. It can also provide information regarding the size of a clonal T-cell population relative to other hematopoietic cells that may be present.

## Additional Ordering Notes

A diagnosis of T-cell malignancy should be suspected based on clinical and/or morphologic assessment, and prior flow cytometry immunophenotyping studies should be performed before ordering this test. If prior flow cytometry or other immunophenotyping studies have not been done, either a comprehensive Leukemia/Lymphoma Phenotyping test (0095244, 0095243, or 0096299) or Neoplastic Mature T-cell Evaluation by Flow Cytometry test (0093000) need to be ordered at the same time. If prior flow cytometry studies were not performed at ARUP, the report and associated histograms (if possible) need to be submitted with the specimen or the results communicated to our laboratory.

## Limitations

Results of this test should be correlated with clinicopathologic and other relevant data, and not be used alone for a diagnosis of T-cell malignancy. This test requires the neoplastic T-cells express an alpha-beta TCR on the cell surface and will not provide information regarding the clonal status of T-cells that express gamma-delta TCR. Small clones or those without phenotypic abnormalities relative to normal T-cells may not be detected with this technique.

## Methodology

Leukocytes are stained with a panel of 24 different anti-Vβ antibodies along with one to three additional markers and analyzed by multiparameter flow cytometry. The additional markers are selected based on prior or concurrent phenotyping results to allow separate Vβ analysis of phenotypically defined populations that show abnormalities relative to normal T-cells and may, therefore, have a high probability of being neoplastic.

## References

1. Beck RC, et al. Detection of mature T-cell leukemias by flow cytometry using anti-T-cell receptor V beta antibodies. *Am J Clin Pathol* 2003;120:785-94.
2. Jamal S, et al. Immunophenotypic analysis of peripheral T-cell neoplasms. A multiparameter flow cytometric approach. *Am J Clin Pathol* 2001;116:512-26.
3. Langerak AW, et al. Molecular and flow cytometric analysis of the Vbeta repertoire for clonality assessment in mature TCR alpha-beta T-cell proliferations. *Blood* 2001;98:165-73.
4. Lundell R, et al. T-cell large granular lymphocyte leukemias have multiple phenotypic abnormalities involving pan-T-cell antigens and receptors for MHC molecules. *Am J Clin Pathol* 2005;124:937-46.
5. Morice WG, et al. Flow cytometric assessment of TCR-Vbeta expression in the evaluation of peripheral blood involvement by T-cell lymphoproliferative disorders: a comparison with conventional T-cell immunophenotyping and molecular genetic techniques. *Am J Clin Pathol* 2004;121:373-83.

## Test Information

**0093199**

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For specific collection, transport, and testing information, refer to the ARUP Web site at [www.aruplab.com](http://www.aruplab.com).