TRECS

T-Cell Receptor Excision Circles Analysis, Blood

Patient ID	Patient Name		Birth Date	Sex	Age
SAMPLE	PATIENT, TEST		2024-09-22	M	8 D
Order Number	**Client Order Number**	**Ordering Physician**	**Report Notes**		
SAMPLE	SAMPLE	SAMPLE	Sample Report		
Account Information		**Collected**			
SAMPLE		30 Sep 2024 10:32			

TREC Analysis, B

TREC Copies

SDL

Reference Value
≥6794

CD3 T Cells

SDL

3 cells/mcL

Low

Reference Value
1484–5327

CD4 T Cells

SDL

2 cells/mcL

Low

Reference Value
733–3181

CD8 T Cells

SDL

1 cells/mcL

Low

Reference Value
370–2555

Previous run date

SDL

02/22/2024

Previous run TREC Copies

SDL

Previous run CD3 T Cells

SDL

3 cells/mcL

Previous run CD4 T Cells

SDL

2 cells/mcL

Previous run CD8 T Cells

SDL

1 cells/mcL

TREC copies are below the acceptable analytical limit of detection (LOD) for this assay.

Interpretation

SDL

Interpretation: The TREC copies in this patient are below the analytic limit of detection. This coincides with inordinate pan-T cell lymphopaenia. Together, the TREC result, the T cell counts and the CD4RTE findings (reported separately) are indicative of decreased thymic output for age. CD4+ T cell homeostasis is maintained largely by thymic output in infants and pre-pubertal children, whereas CD8+ T cell homeostasis is maintained primarily by peripheral expansion of pre-existing T cells. Thymic output accounts for a substantial proportion of the T cell compartment and repertoire until puberty. It also contributes to diversity within the T-cell receptor repertoire.

Clinical Context: Abnormal TREC on newborn screen; patient's brother has had leaky SCID and has received BMT.

Method

SDL

This assay involves both preanalytical preparation of a pure cell population followed at analytical evaluation of the DNA. A modified peripheral blood mononuclear cells (PBMCs) isolation is used to prepare a nearly pure population of CD3+ T cells(adults) or total lymphocytes (pediatrics) from whole blood. The resulting purity and cell counts are obtained from the TCD4 flow cytometric assay. The cells are then lysed with Proteinase K to a predetermined target concentration, to release and expose the DNA for PCR. The genomic DNA and TREC in the cell lysates are quantified in the real-time PCR assay, in triplicate by using a fluorescent probe specific for the TCR delta-deletion T-cell receptor excision circle (TREC) signal joint and distinct fluorescent probe for the housekeeping gene, albumin. There is 1 copy of TREC per CD3+ T cell, while there are 2 copies of albumin in every cell. A standard curve is used to determine the absolute quantity of TREC and albumin from the fluorescence intensities measured. The albumin counts are used to determine the cell counts in each reaction and to normalize the number of TRECC copies to a standard reporting unit of copies per million CD3+ T cells. The pediatric TREC counts, though measured from total lymphocytes, can be adjusted to the same reporting units using the %CD3 purity from the flow cytometric assay. (Douek DC, Vescio RA, Betts MR, et al: Assessment of thymic output in adults after hematopoietic stem cell transplantation and

Performing Site Legend

Code	Laboratory	Address	Lab Director	CLIA Certificate
SDL	Mayo Clinic Laboratories - Rochester Superior Drive	3050 Superior Drive NW, Rochester MN 55905	Nikola Baumann Ph.D.	24D1040592

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prediction of T cell reconstitution. Lancet 2000; 355:1875–1881; Douek DC, Hill B: Personal Communication, 2005)

Disclaimer

[1] SDL

While indicative of thymic function and T-cell recovery, T-cell receptor excision circle (TREC) results cannot be taken as a direct measure of thymic output because TREC are diluted by peripheral T cell division and intracellular degradation. In addition, the longevity of naive T cells in the periphery precludes TREC from being regarded as recent thymic emigrants. The assay provides a quantitative measure of TREC, i.e., TREC copies per million CD3 T cells; however, this number should be regarded as a relative, rather than absolute, number because of the caveats explained above.

The TREC assay should not be ordered on adults over age 60 due to physiological decline in thymic function in the sixth and seventh decades of life.

Assay results are dependent on the patient's T-cell counts and in patients with profound lymphopenia it may be impossible to perform the assay if there are insufficient numbers of cells.

Temperature and time are critical to the performance of the assay. Temperatures that exceed or drop below 20 to 25 degrees C can dramatically affect the assay. High temperatures can cause substantial hemolysis that will interfere with the methodology used to perform the assay. Transportation delays may result in significant TREC degradation.

Timing and consistency in timing of blood collection are critical when serially monitoring patients for lymphocyte subsets. See Clinical Information.

Released By

SDL

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Laboratory Notes

[1] This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

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