Test Definition: TBNK

Quantitative Lymphocyte Subsets: T, B, and NK, Blood

Overview

Useful For

Serial monitoring of CD4 T-cell count in HIV-positive patients

Follow-up and diagnostic evaluation of primary immunodeficiencies, including severe combined immunodeficiency

Immune monitoring following immunosuppressive therapy for transplantation, autoimmunity, and other immunological conditions where such treatment is utilized

Assessment of immune reconstitution post hematopoietic cell transplantation

Early screening of gross quantitative anomalies in lymphocyte subsets in infection or malignancies

Absolute quantitation of circulating B cells for diagnosis of chronic lymphocytic leukemia patients as indicated in the 2008 International Workshop on Chronic Lymphocytic Leukemia guidelines

Method Name

Flow Cytometry

NY State Available

No

Specimen

Specimen Type

Whole Blood EDTA

Shipping Instructions

Specimen must arrive within 48 hours of collection. Collect and package specimen as close to shipping time as possible.

Necessary Information

Date of collection is required.

Specimen Required

For serial monitoring, it is recommended that specimen collection be performed at the same time of day.

Container/Tube: Lavender top (EDTA)
Specimen Volume: 3 mL
Collection Instructions: Send whole blood specimen in original tube. **Do not aliquot.**

Specimen Minimum Volume

1 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole Blood EDTA	Ambient	72 hours	PURPLE OR PINK TOP/EDTA

Clinical & Interpretive

Clinical Information

Normal immunity requires a balance between the activities of various lymphocyte subpopulations with different effector and regulatory functions.

Different immune cells can be characterized by unique surface membrane antigens described by a cluster of differentiation nomenclature (eg, CD3 is an antigen found on the surface of T lymphocytes). Abnormalities in the number and percent of T (CD3), T-helper (CD4), T-suppressor (CD8), B (CD19), and natural killer (CD16+CD56) lymphocytes have been described in a number of different diseases. In patients who are infected with HIV, the CD4 count is measured for AIDS diagnosis and for initiation of antiviral therapy. The progressive loss of CD4 T lymphocytes in patients infected with HIV is associated with increased infections and complications.

The Public Health Service has recommended that all patients who are HIV-positive be tested every 3 to 6 months for the level of CD4 T lymphocytes.

The absolute counts of lymphocyte subsets are known to be influenced by a variety of biological factors, including hormones, the environment, and temperature. The studies on diurnal (circadian) variation in lymphocyte counts have demonstrated progressive increase in CD4 T-cell count throughout the day, while CD8 T cells and CD19+ B cells increase between 8:30 a.m. and noon, with no change between noon and afternoon. Natural killer cell counts, on the other hand, are constant throughout the day.(1) Circadian variations in circulating T-cell counts have been shown to negatively correlate with plasma cortisol concentration.(2-4) In fact, cortisol and catecholamine concentrations control distribution and, therefore, numbers of naive versus effector CD4 and CD8 T cells.(2) It is generally accepted that lower CD4 T-cell counts are seen in the morning compared with the evening(5) and during summer compared to winter.(6) These data, therefore, indicate that timing and consistency in timing of blood collection is critical when serially monitoring patients for lymphocyte subsets.

Reference Values

The appropriate age-related reference values will be provided on the report.

Interpretation

When the CD4 count falls below 500 cells/mcL, patients who are HIV-positive can be diagnosed with AIDS and can receive antiretroviral therapy.

When the CD4 count falls below 200 cells/mcL, prophylaxis against *Pneumocystis jiroveci* pneumonia is recommended.

Cautions

Lymphocyte subset counts should be appropriately interpreted in context of the clinical presentation and other immunological parameters and relevant laboratory test results.

This assay is not used for diagnosing lymphocytic malignancies or evaluation of lymphocytosis of unknown etiology. In these situations, LCMS / Leukemia/Lymphoma Immunophenotyping, Flow Cytometry, Varies, which includes a hematopathology review, should be ordered.

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

Clinical Reference

1. Carmichael KF, Abayomi A: Analysis of diurnal variation of lymphocyte subsets in healthy subjects and its implication in HIV monitoring and treatment. 15th Intl Conference on AIDS. , Bangkok, Thailand, 2004, Abstract B11052
2. Dimitrov S, Benedict C, Heutling D, Westermann J, Born J, Lange T: Cortisol and epinephrine control opposing circadian rhythms in T-cell subsets. Blood. 2009 May 21;113(21):5134-5143
3. Dimitrov S, Lange T, Nohroudi K, Born J: Number and function of circulating antigen presenting cells regulated by sleep. Sleep. 2007 Apr;30(4):401-411
4. Kronfol Z, Nair M, Zhang Q, Hill EE, Brown MB: Circadian immune measures in healthy volunteers: relationship to hypothalamic-pituitary-adrenal axis hormones and sympathetic neurotransmitters. Psychosom Med. 1997 Jan-Feb;59(1):42-50
5. Malone JL, Simms TE, Gray GC, Wagner KF, Burge JR, Burke DS: Sources of variability in repeated T-helper lymphocyte counts from human immunodeficiency virus type 1-infected patients: total lymphocyte count fluctuations and diurnal cycle are important. J Acquir Immune Defic Syndr. 1990;3(2):144-151
6. Paglieroni TG, Holland PV: Circannual variation in lymphocyte subsets, revisited. Transfusion. 1994 Jun;34(6):512-516
7. Hallek M, Cheson BD, Catovsky D, et al: Guidelines for the diagnosis and treatment of chronic lymphocytic leukemia: a report from the International Workshop on Chronic Lymphocytic Leukemia updating the National Cancer Institute Working Group 1996 guidelines. Blood. 2008 Jun 15;111(12):5446-5456
8. Hanson CA, Kurtin PJ, Dogan A: The proposed diagnostic criteria change for chronic lymphocytic leukemia: unintended consequences? Blood. 2009 Jun 18;113(25):6495-6496
9. Hillmen P, Cheson BD, Catovsky D, et al: Letter to Editor. Blood. 2009;113:6497-6498
10. National Institutes of Health. Guidelines for the use of antiretroviral agents adults and adolescents with HIV. Updated September 21, 2022. Accessed January 17, 2023. Available at https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/whats-new-guidelines
11. Thompson MA, Aberg JA, Hoy JF, et al: Antiretroviral treatment of adult HIV infection: 2012 recommendations of the International Antiviral Society-USA panel. JAMA. 2012 Jul 25;308(4):387-402

Performance

Method Description

The T, B, and natural killer cell surface marker assay uses monoclonal antibodies to identify the various membrane antigens, and flow cytometry to enumerate the number of cells expressing these differentiation antigens. The results are reported as the percent of lymphocytes that are total T cells (CD3+), CD3+CD4+ T cells, CD3+CD8+ T cells, natural killer (CD16+56+, CD3-), and B-lymphocytes (CD19+), and the absolute number of each cell type per mL of blood. The assay is a 6-color no-wash procedure and the absolute counts are calculated from internal bead standards. In addition, the total lymphocyte count and the CD4:CD8 ratio are reported.(Hoffman RA, Kung PC, Hansen WP, Goldstein G: Simple and rapid measurement of human T lymphocytes and their subclasses in peripheral blood. Proc Natl Acad Sci USA. 1980 Aug;77(8):4914-4917; Mandy FF, Nicholson JK, McDougal JS; CDC. Guidelines for performing single-platform absolute CD4+ T-cell determinations with CD45 gating for persons infected with human immunodeficiency virus. Centers for Disease Control and Prevention. MMWR Recomm Rep. 2003 Jan 31;52(RR-2):1-13)

PDF Report

No

Day(s) Performed

Monday through Friday, Sunday

Report Available

Same day/1 to 3 days

Specimen Retention Time

3 days

Performing Laboratory Location

Mayo Clinic Jacksonville Clinical Lab

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

86355-B cells, total count
86357-Natural killer (NK) cells, total count
86359-T cells, total count
86360-Absolute CD4/CD8 count with ratio

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
TBNK	QN Lymphocyte Subsets: T, B, and NK	80721-4

Result ID	Test Result Name	Result LOINC® Value
LYMPJ	CD45 Total Lymph Count	27071-0
PCD3J	% CD3 (T Cells)	8124-0
PD19J	% CD19 (B Cells)	8117-4
PD16J	% CD16+CD56 (NK cells)	8112-5
PCD4J	% CD4 (T Cells)	8123-2
PCD8J	% CD8 (T Cells)	8101-8
CD3J	CD3 (T Cells)	8122-4
CD19J	CD19 (B Cells)	8116-6
CD16J	CD16+CD56 (NK cells)	20402-4
CD4J	CD4 (T Cells)	24467-3
CD8J	CD8 (T Cells)	14135-8
H_SJ	4/8 Ratio	54218-3
CMTTB	Comment	80722-2