Test Definition: CYTOP

Cytokine Panel, Plasma

Overview

Useful For

Evaluating the etiology of infectious, autoimmune, or chronic inflammatory diseases, when used in conjunction with clinical information and other laboratory testing

Research studies in which an assessment of cytokine responses is needed

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
IP10P	CXC Motif Chemokine Ligand 10, P	No	Yes
IL10P	Interleukin 10, P	No	Yes
IL18P	Interleukin 18, P	No	Yes
IL6P	Interleukin 6, P	No	Yes
MCP1P	Monocyte Chemoattractant Protein1,P	No	Yes
GMSFP	GM-CSF, P	No	Yes
IFNGP	Interferon Gamma, P	No	Yes
IL17P	Interleukin 17A, P	No	Yes
TNFP	Tumor Necrosis Factor Alpha, P	No	Yes
IL1BP	Interleukin 1-Beta, P	No	Yes
IL8P	Interleukin 8, P	No	Yes
SILRP	IL-2 Receptor Alpha Soluble, P	Yes	Yes

Method Name

Immunoassay

NY State Available

No

Specimen

Specimen Type

Plasma EDTA

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube: Lavender top (EDTA)
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL Plasma
Collection Instructions:
1. Immediately after specimen collection, place the tube on wet ice.
2. Within 2 hours of collection, centrifuge at 4 degrees C, 1500 x *g* for 10 minutes and aliquot plasma into a plastic vial.
3. Freeze immediately.
Additional Information:
1. Plasma for this test cannot be shared with other tests. Submit specimen for this test in its own vial.
2. This test cannot be added onto a previously collected specimen.
3. If a refrigerated centrifuge is not available, it is acceptable to use a room temperature centrifuge, provided the sample is kept on wet ice before centrifugation and is frozen immediately afterward.

Specimen Minimum Volume

Plasma: 0.3 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject
Heat-treated specimen	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma EDTA	Frozen	14 days	

Clinical & Interpretive

Clinical Information

Cytokines are important mediators of cell-to-cell communication within the innate and adaptive immune systems. The expression of most cytokines is highly regulated and generally occurs in response to foreign or self-antigenic stimulation. The functions of cytokines are extremely varied, with many cytokines also displaying pleiotropic effects, depending on their cellular target. For example, tumor necrosis factor alpha (TNFa), interleukin (IL) 1 beta, and IL-6 induce expression of acute phase proteins in the liver. TNFa and IL-1 beta also lead to endothelial activation and are critical regulators of the hypothalamus, which can result in elevated body temperature. IL-6, in comparison, is a bridge to the adaptive immune response, by acting on B cells to induce proliferation.(1,2)

Innate immune cytokines also include key regulators which modulate the strength and duration of the inflammatory

response. IL-10, although produced by both innate and adaptive immune cells, plays an important anti-inflammatory role in innate immunity by suppressing macrophage and dendritic cell activation. IL-18 is a pro-inflammatory cytokine produced primarily through inflammasome activation that enhances natural killer (NK) cell and CD8+ T cell activation, promotes IFNg production, and serves as a potent amplifier of type 1 immune responses.(3)

Several cytokines, including IFNg and IL-17A, are released during T cell activation and play a role in coordinating adaptive and innate immune responses. IFNg, the sole type II interferon, is produced primarily by T-helper 1 (Th1) cells, cytotoxic T cells, and NK cells.(4) It promotes macrophage activation, enhances antigen presentation, supports B cell isotype switching, and drives Th1 differentiation. IL-17A, produced primarily by Th17 cells, stimulates epithelial, endothelial, and stromal cells to produce chemokines and inflammatory mediators that recruit neutrophils and other innate immune cells, underscoring its critical role in host defense against extracellular bacteria and fungi. Soluble forms of several cytokine receptors can also be detected in the peripheral circulation, providing additional regulatory control of cytokine signaling and immune responses. For example, soluble IL-2 receptor alpha (sIL-2Ra) is produced from proteolytic cleavage of the membrane-bound receptor during T cell activation, serving as a marker of immune activation.(5,6)

Chemokines represent a specialized subset of cytokines that primarily regulate leukocyte trafficking. By establishing chemotactic gradients, chemokines direct the migration of immune cells to sites of infection, inflammation, and tissue injury. Examples include CXCL10 (CXC motif chemokine ligand 10, IP-10) which recruits activated CXCR3-expressing immune cells, CXCL8 (IL-8), which recruits neutrophils through CXCR1 and CXCR2 signaling, and CCL2/MCP-1, which attracts monocytes through CCR2 signaling.(7) Additional cytokines regulate hematopoiesis and leukocyte differentiation. For example, granulocyte-macrophage colony-stimulating factor (GM-CSF) promotes the differentiation and activation of myeloid progenitor cells into granulocytes and monocytes/macrophages.

This panel quantifies cytokines representing several arms of the immune response and is useful for evaluating the etiology of infectious, autoimmune, and inflammatory diseases based on their concentrations in plasma.(5,8-14)

Reference Values

CXC MOTIF CHEMOKINE LIGAND 10:
<18 years: Not established
> or =18 years: < or =240 pg/mL

INTERLEUKIN 10:
<18 years: Not established
> or =18 years: < or =4.9 pg/mL

INTERLEUKIN 18:
<18 years: Not established
> or =18 years: < or =324 pg/mL

INTERLEUKIN 6:
<18 years: Not established
> or =18 years: < or =4.4 pg/mL

MONOCYTE CHEMOATTRACTANT PROTEIN 1:
<18 years: Not established

> or =18 years: < or =198 pg/mL

GRANULOCYTE-MACROPHAGE COLONY-STIMULATING FACTOR:
<18 years: Not established
> or =18 years: < or =4.8 pg/mL

INTERFERON GAMMA:
<18 years: Not established
> or =18 years: < or =2.5 pg/mL

INTERLEUKIN 17 ALPHA:
<18 years: Not established
> or =18 years: <5.0 pg/mL

TUMOR NECROSIS FACTOR ALPHA:
<18 years: Not established
> or =18 years: < or =11.8 pg/mL

INTERLEUKIN 1 BETA:
<18 years: Not established
> or =18 years: <2.0 pg/mL

INTERLEUKIN 8:
<18 years: Not established
> or =18 years: < or =7.6 pg/mL

SOLUBLE INTERLEUKIN 2 RECEPTOR ALPHA:
<18 years: Not established
> or =18 years: < or =1929 pg/mL

Interpretation

Elevated cytokine concentrations could be consistent with the presence of infection or another inflammatory process.

Cautions

Results from cytokine testing should not be used to establish or exclude a specific diagnosis.

Cytokine testing should only be used in conjunction with clinical information and other laboratory testing as part of a patient's overall assessment.

Normal concentrations of cytokines do not exclude the possibility of infection or another inflammatory condition.

Cytokine concentrations could be affected by immunomodulatory agents.

Interleukin 6 (IL-6) concentrations may be elevated in patients receiving IL-6 receptor inhibitors, such as tocilizumab, due to receptor blockade and reduced clearance of IL-6. As a result, IL-6 concentrations are not reflective of adequate tocilizumab response. Additionally, patients receiving anti-IL-6 monoclonal antibodies such as siltuximab may also

exhibit interference in IL-6 measurements. For both patient cohorts, a more reliable assessment of IL-6-mediated inflammation can be obtained by measuring downstream acute-phase reactants, such as C-reactive protein.

Clinical Reference

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Performance

Method Description

Measurements of tumor necrosis factor alpha, interleukin (IL) 1 beta, IL-6, IL-8, IL-10, IL-17A, IL-18, CXC motif chemokine ligand 10, monocyte chemoattractant protein 1, interferon gamma, granulocyte-macrophage colony-stimulating factor, and soluble IL-2 receptor alpha are performed using laboratory-developed immunoassays.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed
Wednesday

Report Available
2 to 8 days

Specimen Retention Time
14 days

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Superior Drive

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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
83520 x 11
83529

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CYTOP	Cytokine Panel, P	82335-1

Result ID	Test Result Name	Result LOINC® Value
IL10P	Interleukin 10, P	26848-2
IP10P	CXC Motif Chemokine Ligand 10, P	98102-7
IL18P	Interleukin 18, P	33823-6
IL6P	Interleukin 6, P	26881-3
MCP1P	Monocyte Chemoattractant Protein1,P	97052-5
GMSFP	GM-CSF, P	97054-1
IFNGP	Interferon Gamma, P	27415-9
IL17P	Interleukin 17A, P	82334-4

TNFP	Tumor Necrosis Factor Alpha, P	3074-2
IL1BP	Interleukin 1-Beta, P	13629-1
IL8P	Interleukin 8, P	33211-4
SILRP	IL-2 Receptor Alpha Soluble, P	76039-7