Test Definition: PTEM

Platelet Transmission Electron Microscopic Study, Whole Blood

Overview

Useful For

Diagnosing platelet disorders

Genetics Test Information

This test is indicated for assessing platelet ultra-structural abnormalities in congenital and acquired platelet disorders.

Special Instructions

- Platelet Esoteric Testing Patient Information

Method Name

Transmission Electron Microscopy

NY State Available

Yes

Specimen

Specimen Type

Whole Blood ACD

Shipping Instructions

Send specimen Monday through Wednesday.

Specimens must be received in testing laboratory within 72 hours of collection. Ship specimen overnight in an Ambient Shipping Box-Critical Specimens Only (T668) following the instructions in the mailer.

Necessary Information

Platelet Esoteric Testing Patient Information is required. Testing may proceed without the patient information, however, the information aids in providing a more thorough interpretation. Ordering providers are strongly encouraged to fill out the form and send with the specimen.

Specimen Required

Patient Preparation:

Fasting: 8 hours, preferred but not required

Supplies: Ambient Shipping Box-Critical Specimens Only (T668)

Collection Container/Tube:

Preferred: Yellow top (ACD, solution B)

Acceptable: Yellow top (ACD, solution A)

Specimen Volume: 6 mL
Collection Instructions: Send whole blood specimen in original tube. **Do not aliquot**.

Forms

1. **Platelet Esoteric Testing Patient Information is required.**
2. If not ordering electronically, complete, print, and send a Coagulation Test Request (T753) with the specimen.

Specimen Minimum Volume

3 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole Blood ACD	Ambient	72 hours	

Clinical & Interpretive

Clinical Information

Patients with either hereditary or acquired platelet disorders usually have bleeding diathesis, which can potentially be life threatening. A reliable laboratory diagnosis of a platelet disorder can significantly impact patients' and, potentially, their family members' clinical management and outcome.

Platelet transmission electron microscopy (PTEM) has been an essential tool for laboratory diagnosis of various hereditary platelet disorders since it was first used to visualize fibrin-platelet clot formation in 1955. PTEM employs 2 main methods to visualize platelet ultrastructure, whole mount TEM and thin section TEM.

Whole mount-transmission electron microscopy is considered the gold standard test for diagnosing dense granule deficiencies in Hermansky-Pudlak syndrome, alpha-delta platelet storage pool deficiency, Paris-Trousseau-Jacobsen syndrome, Wiskott-Aldrich syndrome, TAR (thrombocytopenia, absent radii) syndrome, Chediak-Higashi syndrome, and more.

Thin section-transmission electron microscopy is a preferred method to visualize platelet alpha granules, other organelles, and abnormal inclusions.

Platelet disorders that can be detected by PTEM include (but are not limited to):
Delta granules (dense bodies):
-Hermansky Pudlak syndrome

-Wiskott-Aldrich syndrome
-Chediak Higashi syndrome
-Jacobson/Paris-Trousseau syndrome
-York platelet syndrome
-Storage pool deficiency, not otherwise specified

Alpha granules:
-Gray platelet syndrome
-White platelet syndrome
-X-linked *GATA-1* variant
-Jacobson/Paris-Trousseau syndrome

Alpha and delta granules:
-Alpha-delta storage pool deficiency

Reference Values

Mean dense granules/platelet: > or =1.2

Interpretation

Ultrastructural abnormalities identified by platelet transmission electron microscopy (TEM) are evaluated by a Mayo hematopathologist.

Platelet size, alpha granules, Golgi complex, and abnormal inclusions will be assessed as part of the morphologic examination under TEM.

Distinct and sometimes pathognomonic ultrastructural abnormalities are found in Hermansky Pudlak syndrome, gray platelet syndrome with virtually absent alpha granules, white platelet syndrome, Medich giant platelet disorder, X-linked *GATA-1* macrothrombocytopenia, and, recently described, York platelet syndrome.

Cautions

Specimens must be stored and transported at ambient temperature to be received within 72 hours of collection. Suboptimal transportation may cause falsely low dense granule counts.

Supportive Data

Extensive validation studies with normal donors and known patient samples were performed. A total 111 normal donor platelet samples were assessed to establish the baseline. Of the 10 known patient samples, 6 were from patients with Hermansky-Pudlak syndrome, 2 patients had gray platelet syndrome, 1 had *MYH9* variant-associated platelet disorder, and 1 had Paris-Trousseau/Jacobson syndrome.

Clinical Reference

1. White JG. Electron-dense chains and clusters in platelets from patients with storage pool-deficiency disorders. J Thromb Haemost. 2003;1(1):74-79. doi:10.1046/j.1538-7836.2003.00032.x
2. White JG. Use of the electron microscope for diagnosis of platelet disorders. Semin Thromb Hemost. 1998;24(2):163-168. doi:10.1055/s-2007-995836
3. Chen D, Uhl CB, Bryant SC, et al. Diagnostic laboratory standardization and validation of platelet transmission electron

microscopy. Platelets. 2018;29(6):574-582. doi:10.1080/09537104.2018.1476682

Performance

Method Description
This test identifies dense granule deficiency by semiquantitative counting of dense granules on whole mount grids by technologists and verified by a hematopathologist/hematologist.

Whole mount-transmission electron microscopy is a quick and simple way to examine platelet electron opaque or dense granule (DG) by laying platelet-rich plasma on an electron microscopy grid. The high content of calcium in DG blocks electron beam of transmission electron microscopy and creates a sharp dark shadow.(White JG. The dense bodies of human platelets: inherent electron opacity of the serotonin storage particles. Blood. 1969;33[4]:598-606; Winey M, Meehl JB, O'Toole ET, Giddings TH Jr. Conventional transmission electron microscopy. Mol Biol Cell. 2014;25[3]:319-323. doi:10.1091/mbc.E12-12-0863)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
10 days

Specimen Retention Time
Not retained

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

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.

Test Definition: PTEM

Platelet Transmission Electron Microscopic Study, Whole Blood

CPT Code Information

85390
88348

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
PTEM	Platelet TEM, B	79768-8

Result ID	Test Result Name	Result LOINC® Value
CK109	Platelet TEM	79768-8
CK110	Interpretation	59466-3