A Standardised Method for the Ultrastructural Analysis of Platelet Diseases

D. Chen[1]

[1] Special Coagulation Laboratory and Electron Microscopy Core Facility, Mayo Clinic, Rochester, MN, USA.

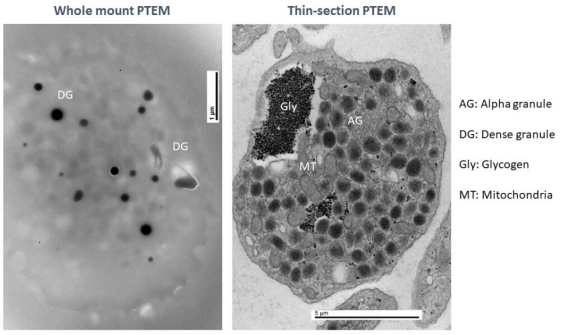
Abstract

Platelet Transmission Electron Microscopy (PTEM) is an essential diagnostic tool for identifying platelet disorders, particularly those involving storage-pool deficiencies. Platelet disorders, which include defects in megakaryopoiesis, surface receptors, storage-pool (alpha and dense granules), and signal transduction pathways, can lead to significant bleeding. While platelet disorders often exhibit both functional and structural abnormalities, the latter can be particularly challenging to detect using light microscopy due to the small size of platelets, making PTEM invaluable in these cases.

PTEM is employed in two distinct forms: whole-mount PTEM, which is used to quantify dense granules, and thin-section PTEM, which provides a detailed examination of alpha granules and other cytoplasmic ultrastructures. This advanced technique is crucial for diagnosing conditions such as Hermansky-Pudlak syndrome, Gray Platelet Syndrome, and other complex phenotypes that might be overlooked by standard diagnostic tests. Establishing normal ranges for platelet dense granules in both adult and pediatric populations enhances the precision of diagnosing platelet dense granule deficiencies, facilitating more accurate clinical assessments.

Despite the challenges related to standardization, sample stability, and interpretation, PTEM's ability to provide detailed ultrastructural insights makes it indispensable in clinical practice. When combined with genetic testing, PTEM significantly improves the accuracy of diagnosing platelet disorders.

Normal whole mount PTEM and thin-section PTEM.



References

1. 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
2. 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