Platelet Surface Glycoprotein Expression by Flow Cytometry

Indications for Ordering
Use to diagnose Bernard-Soulier syndrome or Glanzmann thrombasthenia in patients with a lifelong history of platelet-type bleeding

Test Description
Qualitative flow cytometry

Tests to Consider

Typical testing strategy
Initial testing
- Complete blood count with platelet count and peripheral smear to evaluate platelet morphology and size indices
  - Platelet count
    - Decreased in Bernard-Soulier syndrome
    - Normal in Glanzmann thrombasthenia
  - Peripheral smear
    - Giant platelets in Bernard-Soulier syndrome
    - Normal platelet morphology in Glanzmann thrombasthenia
- Basic coagulation tests (prothrombin time [PT], partial thromboplastin time [PTT], fibrinogen)

Platelet aggregation studies when functional disorders are suspected
- Must be performed locally due to requirement for fresh patient platelets and limited specimen stability

Platelet flow cytometric analysis if
- Above studies suggest Bernard-Soulier syndrome or Glanzmann thrombasthenia
- Platelet aggregation test is not available
- Patient is thrombocytopenic

Primary test
Platelet Surface Glycoprotein Expression (PGE) by Flow Cytometry, Whole Blood 2013070

Related tests
Platelet Aggregation Studies (UUHSC testing only) 0030160
- Time sensitive – 4-hour specimen stability
- Evaluates platelet function in patients with
  - Suspected inherited qualitative platelet disorders
  - Lifelong platelet-type bleeding
- Absent or markedly decreased platelet aggregation in response to ristocetin in Bernard-Soulier syndrome

- Absent or markedly decreased aggregation in response to adenosine diphosphate (ADP), collagen, arachidonic acid, and epinephrine in patients with Glanzmann thrombasthenia
- Not recommended for patients with thrombocytopenia (<100,000/μL)

Disease Overview

Incidence
- Rare inherited autosomal recessive disorders

Age of onset
- Directly correlated with amount of functional glycoproteins (GP) expressed on platelets
- Usually manifests in early childhood

Symptoms
Bernard-Soulier syndrome and Glanzmann thrombasthenia
- Bleeding tendency
  - Childbirth/postpartum
  - Gastrointestinal
  - Gingival
  - Mucocutaneous
  - Tooth extraction
  - Trauma/surgical procedures
- Easy bruising/ecchymoses/purpura
- Epistaxis
- Menorrhagia

Diagnostic issues
- Platelet flow cytometric analysis is preferred method to evaluate hereditary platelet dysfunction due to quantitative deficiencies in surface GP expression
- Platelet flow cytometric test is recommended for patients with platelet-type bleeding symptoms and thrombocytopenia because functional platelet aggregation studies are less reliable in patients with thrombocytopenia
Pathophysiology

- Bernard-Soulier syndrome – GP Ib/IX/V (CD42b) is absent or dysfunctional
  - GP Ib/IX/V complex is a receptor for von Willebrand factor on platelets that enables platelet adhesion to the site of vascular injury
- Glanzmann thrombasthenia – GP IIb/IIIa (CD41/CD61) is absent or dysfunctional
  - GP IIb/IIIa is a receptor for fibrinogen on platelets that facilitates platelet aggregation at the site of vascular injury

Test Interpretation

Results

- Normal
  - Normal expression of platelet GP Ib and GP IIb/IIIa
    - No evidence of Bernard-Soulier syndrome or Glanzmann thrombasthenia
- Abnormal
  - Absent or significantly reduced expression of GP Ib and normal expression of GP IIb/IIIa
    - Consistent with the diagnosis of Bernard-Soulier syndrome
  - Absent or significantly reduced expression of GP IIb/IIIa and normal expression of GP Ib
    - Consistent with the diagnosis of Glanzmann thrombasthenia
- Mild decrease
  - Mild decrease in the expression of GP Ib or GP IIb/IIIa
    - Suggests a variant or heterozygous state of Bernard-Soulier syndrome or Glanzmann thrombasthenia, respectively
    - Mild decrease in platelet GP expression could also be a laboratory artifact due to suboptimal specimen condition
    - Correlation with clinical findings and other platelet function or sequence analysis is recommended

Limitations

Dysfunctional platelet defects with normal expression of platelet GP cannot be detected by this test