Overview

Useful For

Resolving discrepancies when results of complementary laboratory tests (eg, F8A / Coagulation Factor VIII Activity Assay, Plasma; VWACT / von Willebrand Factor Activity, Plasma; and VWAG / von Willebrand Factor Antigen, Plasma) are abnormally low or discordant

Subtyping von Willebrand disease (VWD) (primarily identify variants of type 2 VWD)

Aiding in determining appropriate treatment

Identifying variants of type 2 VWD that have fewer of the largest multimers, have unusually large multimers, or have qualitatively abnormal "bands" that indicate an abnormal von Willebrand factor structure

Special Instructions

- Coagulation Guidelines for Specimen Handling and Processing
- Coagulation Patient Information

Method Name

Agarose Gel Electrophoresis/Infrared Dye-Labeled Antibody Detection

NY State Available

Yes

Specimen

Specimen Type

Plasma Na Cit

Advisory Information

Coagulation testing is highly complex, often requiring the performance of multiple assays and correlation with clinical information. For that reason, we suggest ordering AVWPR / von Willebrand Disease Profile, Plasma.

Additional Testing Requirements

VWACT / von Willebrand Factor Activity, Plasma and VWAG / von Willebrand Factor Antigen, Plasma are requested but not required before performing this test. If already assayed, submit results. If no results are included, submit separate specimens for the above assays following specimen requirements for each test.

Shipping Instructions

Specimen Required

See Coagulation Studies :Guidelines for Specimen Handling and Processing in Special Instructions.

Patient Preparation:

1. Fasting is preferred.

2. Specimen should be drawn prior to coagulation factor replacement therapy.
**Collection Container/Tube:** Light-blue top (citrate)

**Submission Container/Tube:** Plastic vial

**Specimen Volume:** 1 mL

**Collection Instructions:**

1. Centrifuge, transfer all plasma into a plastic vial, and centrifuge plasma again.

2. Aliquot plasma into a plastic vial leaving 0.25 mL in the bottom of centrifuged vial.

3. Freeze plasma immediately (no longer than 4 hours after collection) at -20 degrees C or, ideally, < or =-40 degrees C.

**Additional Information:**

1. Double-centrifuged specimen is critical for accurate results as platelet contamination may cause spurious results.

2. Each coagulation assay requested should have its own vial.

**Forms**

1. [Coagulation Patient Information](T675) in Special Instructions.

2. If not ordering electronically, complete, print, and send a [Coagulation Test Request](T753) with the specimen.

**Specimen Minimum Volume**

0.5 mL

**Reject Due To**

<table>
<thead>
<tr>
<th>Gross hemolysis</th>
<th>Reject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross lipemia</td>
<td>Reject</td>
</tr>
<tr>
<td>Gross icterus</td>
<td>Reject</td>
</tr>
</tbody>
</table>

**Specimen Stability Information**

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma Na Cit</td>
<td>Frozen</td>
<td>42 days</td>
<td></td>
</tr>
</tbody>
</table>

**Clinical and Interpretive**

**Clinical Information**

von Willebrand factor (VWF) is a large multimeric plasma glycoprotein that has essential roles in primary hemostasis. Wild-type VWF molecules are series of multimers varying in size from dimers to multimers over 40 subunits (>10 million Daltons). The largest multimers provide multiple binding sites that can interact with both platelet receptors and subendothelial matrix sites of injury, and are the most hemostatically active form of VWF. The biological functions of VWF are as follows:
1. VWF is a ligand and mediates platelet adhesion to the subendothelial collagen at the site of vessel wall injury by binding to the platelet receptor glycoprotein (GP)-Ib, V, IX complex, and subendothelial collagen

2. VWF binds and stabilizes procoagulant factor VIII in the circulation

3. Under conditions of high shear, VWF also mediates platelet-platelet cohesion by binding to the platelet receptor GP-IIb/IIIa (integrin alpha IIb beta3)

von Willebrand disease (VWD) is the most common hereditary bleeding disorder that is caused by quantitative or qualitative VWF defect. VWD manifests clinically as easy bruising, mucocutaneous bleeding (eg, epistaxis, menorrhagia), and bleeding after trauma or surgery.

VWD has been classified into 3 major types:

- Type 1, typically an autosomal dominant disease, is the most common, accounting for approximately 70% of VWD patients. It represents a quantitative deficiency of VWF of variable severity.

- Type 2, which is usually an autosomal dominant disease, is characterized by several qualitative abnormalities of VWF. Four subtypes have been identified: 2A, 2B, 2M, and 2N.

- Type 3, an autosomal recessive disorder, leads to severe disease with virtually undetectable levels of VWF, as well as very low levels of factor VIII.

Acquired von Willebrand syndrome (AVWS) is associated with a number of different disease states and is caused by several different pathophysiological mechanisms, including antibody formation, proteolysis, binding to tumor cells with increased clearance, and decreased synthesis. AVWS is most frequently described in patients with dysproteinemias (including monoclonal gammopathy of undetermined significance [MGUS], multiple myeloma, and macroglobulinemia), lymphoproliferative disorders, myeloproliferative disorders (eg, essential thrombocythemia), autoimmune diseases (eg, systemic lupus erythematosus), high-shear stress cardiovascular conditions such as severe aortic stenosis, gastrointestinal angiodysplasia, and hypothyroidism.

Reference Values
An interpretive report will be provided.

Interpretation
The plasma von Willebrand factor (VWF) multimer analysis is a qualitative visual assessment of the size spectrum and the banding pattern of VWF multimers.

Cautions
Von Willebrand factor (VWF) multimer analysis is not useful if the following tests are normal:

- F8A / Coagulation Factor VIII Activity Assay, Plasma
- RIST / Ristocetin Cofactor, Plasma
- VWACT / von Willebrand Factor Activity, Plasma
Test Definition: VWFMS
von Willebrand Factor Multimer, P

-VWAG / von Willebrand Factor Antigen, Plasma

Or when:

-The VWF ristocetin cofactor:vWF antigen ratio is ≥ 0.7

-The vWF activity:vWF antigen ratio is > or =0.8

Clinical Reference


Performance

Method Description
Platelet-poor plasma proteins are denatured using heat and an anionic detergent, sodium dodecyl sulfate. The sample is then electrophoresed through a discontinuous agarose gel on a cooled horizontal electrophoresis unit overnight to separate the von Willebrand factor (VWF) multimers by size. The gel is fixed in acid and isopropanol, washed in water, and incubated with dilute rabbit-antihuman VWF. After washing away unbound antibody, the gel is incubated with dilute goat-antirabbit IgG antibody tagged with an infrared dye. Excess secondary antibody is washed away, and the gel is scanned using an infrared imaging system. The digitized image of the electrophoretic distribution of the VWF multimers is interpreted by a coagulation consultant and a written report is provided. (Favaloro EJ, Koutts J: Chapter 34: Diagnosis of von Willebrand Disease. In Laboratory Hematology Practice Edited by K Kottke-Marchant. Wiley Blackwell Publishing. 2012, pp 447-459)

PDF Report
No

Day(s) and Time(s) Test Performed
Monday through Thursday (varies); 9 a.m.-4 p.m.

Analytic Time
7-10 days

Maximum Laboratory Time
14 days

Specimen Retention Time
Test Definition: VWFMS
von Willebrand Factor Multimer, P

21 days

Performing Laboratory Location
Rochester

Fees and 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 Regional Manager. 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. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information
85247

LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VWFMS</td>
<td>von Willebrand Factor Multimer, P</td>
<td>48595-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>603851</td>
<td>von Willebrand Factor Multimer, P</td>
<td>No LOINC Needed</td>
</tr>
<tr>
<td>603855</td>
<td>VWF Multimer Interpretation</td>
<td>48595-3</td>
</tr>
</tbody>
</table>