

## Overview

### Useful For

As a reflex component of several coagulation consultation unit codes, when indicated

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

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

As an aid in determining appropriate treatment

### Special Instructions

- [Coagulation Guidelines for Specimen Handling and Processing](#)

### Method Name

Only orderable as part of a coagulation reflex. For more information see:

ALUPP / Lupus Anticoagulant Profile, Plasma  
ALBLD / Bleeding Diathesis Profile, Limited, Plasma  
ACBL / Bleeding Diathesis Profile, Comprehensive, Plasma  
AVWPR / von Willebrand Disease Profile, Plasma

Agarose Gel Electrophoresis

### NY State Available

Yes

## Specimen

### Specimen Type

Plasma Na Cit

### Specimen Required

Only orderable as part of a coagulation reflex. For more information see:

ALUPP / Lupus Anticoagulant Profile, Plasma  
ALBLD / Bleeding Diathesis Profile, Limited, Plasma  
AVWPR / von Willebrand Disease Profile, Plasma

For more information see [Coagulation Guidelines for Specimen Handling and Processing](#).

Reject Due To

|                 |        |
|-----------------|--------|
| Gross hemolysis | Reject |
| Gross lipemia   | Reject |
| Gross icterus   | Reject |

Specimen Stability Information

| Specimen Type | Temperature | Time    | Special Container |
|---------------|-------------|---------|-------------------|
| Plasma Na Cit | Frozen      | 42 days |                   |

Clinical & 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

Only orderable as part of a coagulation reflex. For more information see:

ALUPP / Lupus Anticoagulant Profile, Plasma

ALBLD / Bleeding Diathesis Profile, Limited, Plasma

AVWPR / von Willebrand Disease Profile, Plasma

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.

This test is used to identify variants of type 2 von Willebrand disease (VWD) that have fewer of the largest multimers, have unusually large multimers, or have qualitatively abnormal "bands" that indicate an abnormal vWF structure.

## 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

-VWAG / von Willebrand Factor Antigen, Plasma

Or when:

-The vWF ristocetin cofactor:vWF antigen ratio is greater than or equal to 0.7

-The vWF activity:vWF antigen ratio is greater than or equal to 0.8

## Clinical Reference

1. Budde U, Schnepfenheim R. von Willebrand Factor and von Willebrand Disease. Rev Clin Exp Hematol. 2001;5(4):335-368
2. Ruggeri ZM. Structure and function of von Willebrand Factor: Relationship to von Willebrand's disease. Mayo Clinic Proc. 1991;66(8):847-861
3. Sadler JE. A revised classification of von Willebrand Disease. Thromb Haemost. 1994;71(4):520-525
4. Laffan M, Brown SA, Collins PW, et al. The diagnosis of von Willebrand disease: a guideline from the UK Haemophilia Centre Doctors Organization. Haemophilia. 2004;10(3):199-217
5. Mannucci PM. Treatment of von Willebrand's Disease. N Engl J Med 2004;351(7):683-694
6. Pruthi RK, Daniels TM, Heit JA, et al. Plasma von Willebrand factor multimer quantitative analysis by in-gel immunostaining and infrared fluorescent imaging. Thrombo Res. 2010;126(6):543-549
7. Favaloro EJ and Lippi G. eds. Hemostasis and Thrombosis, Methods and Protocols. Humana Press 2017

## 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. (Ruggeri ZM, Zimmerman TS: Variant von Willebrand's disease. Characterization of two subtypes by analysis of multimeric composition of FVIII/vWF in plasma and platelets. J Clin Invest 1980;65:1318-1325; Favaloro EJ and Lippi G. eds. Hemostasis and Thrombosis, Methods and Protocols. Humana Press 2017)

### PDF Report

No

### Day(s) Performed

Monday, Tuesday

### Report Available

7 to 14 days

### Specimen Retention Time

21 days

### 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.

### CPT Code Information

85247

LOINC® Information

| Test ID | Test Order Name                   | Order LOINC® Value |
|---------|-----------------------------------|--------------------|
| VWFMP   | von Willebrand Factor Multimer, P | 32217-2            |

| Result ID | Test Result Name                  | Result LOINC® Value |
|-----------|-----------------------------------|---------------------|
| 604411    | von Willebrand Factor Multimer, P | 32217-2             |
| 604412    | VWF Multimer Interpretation       | 48595-3             |