

von Willebrand factor (VWF)



Description, significance:

VWF is a high molecular weight multimeric protein. It is synthesized in the endothelial cells, polymerized into very large multimers and stored intracellularly in the Weibel-Palade bodies. As part of the activation of endothelial cells (e.g. through injuries, hypoxia, toxins, thrombin, etc.), the high molecular weight VWF is released. When the integrity of a blood vessel is violated, the VWF binds to the exposed collagen and is stretched by blood flow. This exposes the A1 domains to which platelets bind via their GP Ib/IX receptors. As a result, the platelets are activated, change their shape, release phospholipids and procoagulant factors and express GP IIb/IIIa. Other platelets can also aggregate via fibrinogen bridges. This creates a microclot rich in platelets and VWF, rich in phospholipids on which the plasmatic coagulation cascade can then take place.

The VWF size is regulated by the enzyme ADAMTS13, which cleaves the VWF at the A2 domains. The different effects of VWF can be measured with specific methods. Screening for von Willebrands disease can be carried out with VWF:Ag and VWF:Akt.

- *VWF:Antigen* = immunological measurement of VWF protein concentration
- *VWF:Activity* = Measurement of VWF activity with recombinant GP Ib fragment
- *VWF:RiCo* = ristocetin cofactor = platelet-aggregating activity of VWF
- *VWF:CB* = collagen-binding activity of VWF
- *VWF:FVIII* = FVIII-binding activity of VWF
- *VWF: multimeric pattern* = electrophoretic separation and assessment of the multimer structure
- *VWF genetic analysis*

Reference range:

varies depending on the test system, usually between 50-180%.

Increased values:

VWF is an acute phase protein, increased levels are found during infections, inflammation, aging, stress, pregnancy, postoperatively, etc.

Decreased values:

People with blood group O have physiologically lower VWF levels. The different forms of von Willebrand disease have decreased VWF in some assays.

Preanalytics:

VWF is determined from citrated plasma. Care must be taken to collect blood accurately, avoid contamination, fill the blood tube correctly and mix well with the citrate. The blood sample must be sent to the laboratory as quickly as possible.

References:

Thomas L, Laboratory and Diagnosis, 2023, Release 5: <https://www.labor-und-diagnose.de/index.html>
Parameter catalog of the Clinical Institute for Laboratory Medicine, Med.Univ.Wien and AKH Vienna: <https://www.akhwien.at/default.aspx?pid=3982>
List of services for clinical chemistry, Univ.Klinikum Ulm: <https://www.uniklinik-ulm.de/zentrale-einrichtung-klinische-chemie/leistungskatalog.html>