

# Coagulation Factor V Deficient Plasma

**FACTOR V DEFICIENT**

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## Intended Use

**FACTOR V DEFICIENT** is an in vitro diagnostic reagent for use in assays for the quantitative, WHO-standardized determination of coagulation factor V (FV) activity as aid to diagnosis of congenital or acquired FV deficiencies in patients with bleeding disorders or at risk for FV deficiency in human sodium citrated plasma by means of automated, semi-automated and/or manual coagulometric methods.

In addition **FACTOR V DEFICIENT** can be used as aid to identification of the presence of factor V Leiden in human sodium citrated plasma.

## Summary and Explanation

Coagulation Factor V (FV) is involved in the common pathway of the coagulation system; consequently a prolongation of prothrombin time (PT) and activated partial thromboplastin time (APTT) are seen in case of a FV deficiency. However, FV deficiency has a stronger impact on PT compared to APTT; hence the PT-based one-stage clotting assay using **FACTOR V DEFICIENT** is applied for determination of FV activity. Patients with FV deficiency can experience bleeding<sup>1,2</sup>.

The determination of FV in plasma is indicated in the following cases:

- clarifying the cause of a prolonged PT,
- diagnosing congenital or acquired factor deficiency states,
- testing the protein synthesis function in liver diseases<sup>3</sup>

Furthermore, FV is involved in the protein C anticoagulant pathway. FVL is a frequent point mutation in the FV molecule, associated with a lower inactivation rate of activated FV, and a thrombophilic tendency in affected individuals. For detection of FVL a protein C pathway assay in combination with FV Deficient Plasma can be used<sup>4,5</sup>.

## Principles of the Procedure

Incubation of **FACTOR V DEFICIENT** with diluted patient plasma and a thromboplastin leads to activation of the factors of the extrinsic coagulation pathway. The time is measured from the addition of the thromboplastin to the formation of a fibrin clot. For the detection of FVL, please consult the Instructions for Use of ProC® Global (**REF** OQLS13).

## Reagents

**Note:** **FACTOR V DEFICIENT** can be used manually or on automated coagulation analyzers. Sysmex provides Reference Guides (Application Sheets) for several coagulation analyzers. The Reference Guides (Application Sheets) contain analyzer/assay specific handling and performance information which may differ from that provided in these Instructions for Use. In this case, the information contained in the Reference Guides (Application Sheets) supersedes the information in these Instructions for Use. Please also consult the instruction manual of the instrument manufacturer!

| Reagent  | Description  | Storage  | Stability   |
|--|--|--|---|
| Coagulation Factor V Deficient Plasma<br><b>FACTOR V DEFICIENT</b> | Lyophilized reagent containing: <ul style="list-style-type: none"> <li>human plasma<sup>a</sup>, FV activity ≤ 1 %</li> <li>Heparin neutralizer: <ul style="list-style-type: none"> <li>Hexadimethrine bromide</li> </ul> </li> <li>Stabilizer: <ul style="list-style-type: none"> <li>D-Mannitol (reconstituted: 20 g/L)</li> </ul> </li> </ul> | 2–8 °C<br>May be used up to the expiry date indicated on the label if stored unopened. | 15–25 °C: reconstituted, 24 hours <sup>b</sup> ;<br>–20 °C: reconstituted, 4 weeks <sup>c,d</sup> |

<sup>a</sup> from pooled plasma collected from selected healthy blood donor

<sup>b</sup> opened vial

<sup>c</sup> closed original vial

<sup>d</sup> not applicable if used with ProC® Global

**FACTOR V DEFICIENT** can be frozen and thawed once after reconstitution without a loss of coagulation activity. The plasma must be well sealed and frozen as quickly as possible. Thawing should be accomplished at 37 °C within 10 minutes. Thawed plasma should be used within 2 hours when held at 15 to 25 °C.

#### On-board stability

Information regarding on-board stability is specified in the Reference Guides (Application Sheets) for the different coagulation analyzers.

## Warnings and Precautions

For *in-vitro* diagnostic use only.

For laboratory professional use.

According to EU regulation 2017/746, any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the EU Member State through your local distribution representative in which the user and/or patient is established.

Safety data sheets (MSDS/SDS) available upon request.



#### CAUTION! POTENTIAL BIOHAZARD

Each donor or donor unit was tested and found to be negative for human immunodeficiency virus (HIV) 1 and 2, hepatitis B virus (HBV) and hepatitis C virus (HCV) using either tests that are CE marked or FDA approved for this purpose. Because no known test can offer complete assurance of the absence of infectious agents, all human derived products should be handled with appropriate caution.

#### Caution

This device contains material of animal origin and should be handled as a potential carrier and transmitter of disease.

Dispose of hazardous or biologically contaminated materials according to the practices of your institution. Discard all materials in a safe and acceptable manner and in compliance with all government requirements.

## Preparing Reagents

**FACTOR V DEFICIENT**: Dissolve the contents of a vial with 1 mL of distilled or deionized water. Before use, let stand at least 15 minutes at 15 to 25 °C, then shake carefully to mix (without foam formation). Mix carefully once more before using.

PT reagents: Use according to the respective Instructions for Use.

## Specimen Collection and Handling

### Collecting the Specimen

To obtain the plasma, carefully mix 1 part sodium citrate solution 0.11 mol/L (3.2 %) with 9 parts venous blood, avoiding the formation of foam. Centrifuge the blood specimen at 1 500 × g for no less than 15 minutes at room temperature<sup>6</sup>.

## Storing the Specimen

Stability of the samples:

15 to 25 °C 3 hours

–20 °C 4 weeks

Plasma stored at –20 °C is to be thawed in a water bath within 10 minutes at 37 °C, mixed gently and then tested immediately. If testing cannot be performed immediately, the specimen may be held for a maximum of 2 hours at 4 °C until tested<sup>6</sup>.

## Procedure

### Materials Provided

| REF   | Contents  |            |
|-------|---|------------|
| ORM19 | Coagulation Factor V Deficient Plasma<br>FACTOR V DEFICIENT | 8 × → 1 mL |

### Materials Required but not Provided

| Item   | Description  |
|--|--|
| REF OUHP29, OUHP49                               | Thromborel® S, or  |
| REF B4212-40, B4212-50, B4212-100                | Dade® Innovin®   |
| REF ORKE41                                       | CONTROL N, Control Plasma N  |
| REF OUPZ17                                       | CONTROL P, Control Plasma P  |
| REF OQAA33                                       | IMIDAZOLE BUFFER, Imidazole Buffer Solution or   |
| REF B4234-25                                     | OV BUFFER, Dade® Owren's Veronal Buffer or   |
| REF B4265-35, B4265-37                           | CA SYSTEM BUFFER, Dade® CA System Buffer or  |
| –  | Physiological Saline Solution  |
| REF ORKL17                                       | STANDARD PLASMA, Standard Human Plasma   |
| REF OQLS13                                       | For the detection of FVL:<br>ProC® Global  |
| REF OQKE17                                       | ProC CONTROL, ProC® Control Plasma   |
| Coagulation analyzers <sup>e</sup> ,<br>such as: | <ul style="list-style-type: none"> <li>AUTOMATED BLOOD COAGULATION ANALYZER CS-2500 (CS-2500 System)</li> <li>AUTOMATED BLOOD COAGULATION ANALYZER CS-5100 (CS-5100 System)</li> </ul> |

<sup>e</sup> Availability of analyzers may vary by country.

Please note that the applications on other analyzers can be validated by the instrument manufacturer in accordance with the requirements of the REGULATION (EU) 2017/746 under their responsibility as long as the intended purpose and performance are not modified.

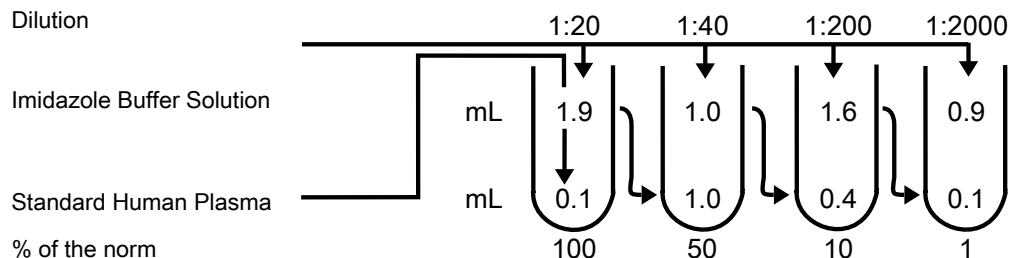
## Manual Testing

(Coagulometric Determination)

|   |        |
|---|--------|
| Dilute the plasma sample 1:20 in IMIDAZOLE BUFFER (bring to room temperature (15–25 °C)). Pipette into a test tube pre-warmed to 37 °C: |        |
| FACTOR V DEFICIENT  | 100 µL |
| Sample dilution   | 100 µL |
| Incubate at 37 °C for exactly 60 seconds  |        |
| PT reagent (pre-warmed 37 °C)   | 200 µL |
| On addition of PT reagent start stop-watch or timer on the coagulation analyzer and determine the coagulation time.                     |        |

## Establishment of the Reference Curve

Use either **STANDARD PLASMA** or fresh citrated pooled plasma from no less than 10 healthy donors. Using **IMIDAZOLE BUFFER**, prepare dilutions as shown in the following scheme and determine the coagulation times as described under "Manual Testing", page 3. The reference curve must be re-generated if there is a change in the instrument or in the lot of reagent used, or if there is any change in the experimental conditions.



Additional dilutions can be prepared if necessary. Plot the measured coagulation times (ordinate) on log graph paper against the corresponding percentage Factor V activities (abscissa). The coagulation times are dependent on the measurement principle and thus also on the coagulation analyzer used. Therefore, each laboratory must establish its own reference curve.

## Detection of FVL

See Instructions for Use for ProC® Global.

## Internal Quality Control

Normal range: **CONTROL N**

Pathological range: **CONTROL P**

Two levels of quality control material (normal and pathologic range) have to be measured at start of the test run, with each calibration, upon reagent vial changes and at least every eight hours on each day of testing. The controls should be processed just like the samples. Each laboratory should establish its own quality control range, either by means of the target values and ranges provided by the manufacturer of the controls or by means of its own confidence ranges established in the laboratory. If the control values lie outside the confidence range determined beforehand, then the reagent, calibration curve and coagulation analyzer should be checked. Patient results must not be released until the cause of the deviation is identified and corrected.

## Results

Read the FV content from the reference curve in % of Norm. If the given nominal value of the Standard Human Plasma is not 100 % of Norm, but e.g. only 95 %, multiply the result read from the curve by 0.95. In the case of coagulation times which correspond to a FV content of more than 100 % of Norm, further determinations will be required using higher dilutions of specimen (e.g. 1:40). The percent of norm value read from the reference curve for such a higher dilutions must be multiplied by a correction factor corresponding to the dilution; e.g. for a dilution of 1:40 by a correction factor of 2.

## Limitations

Therapeutic doses of hirudin or other direct thrombin inhibitors lead to an erroneously lower factor activity<sup>7,8</sup>. Specific inhibitors against plasmatic coagulation factors may also modify the real factor activity<sup>9</sup>. Partial activation of the coagulation factors due to incorrect sample handling can lead to falsely elevated FV results. Lupus anticoagulants can influence the PT and thus also affect coagulation factor determinations<sup>10</sup>.

The manufacturer has validated use of these reagents on various analyzers to optimize product performance and meet product specifications. Please note that the applications on other analyzers can be validated by the instrument manufacturer in accordance with the requirements of the REGULATION (EU) 2017/746 under their responsibility as long as the intended purpose and performance are not modified. User defined modifications are not supported by the manufacturer as they may affect performance of the system and assay results. It is the responsibility of the user

to validate modifications to these instructions or use of the reagents on analyzers other than those included in Application Sheets or these Instructions for Use.

Results of this test should always be interpreted in conjunction with the patient's medical history, clinical presentation and other findings.

## Expected Values<sup>11</sup>

70 to 120 % of Norm

Reference intervals vary from laboratory to laboratory depending on the population served and the technique, method, equipment and reagent lot used. Therefore, each laboratory must establish its own reference intervals or verify them whenever one or more of the aforementioned variables are changed.

## Performance Characteristics

### Measuring Range

The measuring range depends on the individual application of the assay due to instrument related conditions. Application specific performance data is listed in the respective Reference Guides of the instruments.

For manual methods the measuring range for the determination of coagulation FV extends from 1 to approximately 100 % of Norm, and can be increased to approximately 200 % of Norm by using a higher dilution of sample (see above).

### Precision

Reproducibility studies for the determination of FV were run on the BCS® System with samples both in the normal and pathological range. Samples were run in 8-fold determinations over 5 days with stored calibration curves. The reproducibility studies resulted in coefficients of variation of 7.3 to 9.9 %.

Other system specific results are given in the respective Reference Guides (Application Sheets).

The reproducibility was assessed by the manufacturer for coagulation factor V based on publicly available proficiency testing information in 2020. The overall reproducibility median CV% was found to be <9 % including PT reagent used, lot, instrument, laboratory and operator variability factors.

### Method Comparison

A study was performed comparing the performance of FV with Thromborel® S on the BCS® System to the BCT System.

The correlations resulted in the following:

|          | n  | Slope | Intercept<br>[% of Norm] | Correlation Coefficient |
|----------|----|-------|--------------------------|-------------------------|
| Factor V | 83 | 0.97  | -0.2                     | 0.97                    |

## Technical Assistance

For customer support, contact your local technical support provider or distributor.

### Current Version of Application Sheets

**FACTOR V DEFICIENT** can be used in combination with various automated coagulation analyzers. Sysmex provides Reference Guides/Application Sheets for the coagulation analyzers listed in section "Materials Required but not Provided", page 3 under the dedicated link below:

[sysmex-ifu.com/ag](http://sysmex-ifu.com/ag)

As the manufacturer continuously monitors the product performance and safety, the users are required to ensure that they work with the correct revision of the instructions for the product lots in use. Please periodically review the availability of new electronic labeling revisions to ensure safe use of the product.


























The IFU version number is visible on each product box label. Sysmex ensures that all products lots bearing the same IFU version number are compatible with the electronic labeling provided via [sysmex-ifu.com](http://sysmex-ifu.com).

## References

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## Definition of Symbols

The following symbols may appear on the product labeling:

|   |   |   |  |
|---|---|---|--|
|  | Do not reuse  |  | Use By   |
|  | Batch Code  |  | Catalogue Number   |
|  | Caution   |  | Manufacturer   |
|  | Authorized representative in the European Community |  | Authorized representative in Switzerland   |
|  | Contains sufficient for <n> tests                   |  | Biological Risks   |
|  | <i>In Vitro</i> Diagnostic Medical Device           |  | Temperature Limitation   |
|  | Consult instruction for Use                         |  | Non-sterile  |
|  | CE marking of conformity                            |  | CE marking of conformity with notified body ID number. Notified body ID number can vary. |
|  | Contents  |  | Reconstitution volume  |
|  | Level   |  | Keep away from sunlight and heat   |
|  | Warning   |  | Danger   |
|  | Prescription device (US only)                       |  | Device Identification (UDI) barcode  |
|  | REACH Authorization Number<br>xx/xx/xx              |   |  |

## Legal Information

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