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nal von minden

NADAL® CRP QUANT Test (test cassette)

REF 312024NBUL-20

IVD CE

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NADAL® CRP QUANT Test (Ref. 312024NBUL-20)

1. Intended Use

The NADAL® CRP QUANT Test (whole blood/ serum/ plasma) is used for the quantitative determination and monitoring of CRP in human whole blood, serum and plasma. The test is used as an aid in the diagnosis of bacterial infectious diseases and inflammatory processes. The quantitative measurement and evaluation of the test result must be carried out using the nal von minden Colibr*i*. The test is for professional use only.

2. Introduction

The C-reactive protein (CRP) is a non specific acute phase protein which is used in the diagnosis of bacterial infectious diseases and inflammatory processes, e.g. acute rheumatic fever and rheumatoid arthritis.[1,2] CRP values with viral infections will not increase in the same way as with bacterial infections, therefore this parameter can contribute to their differentiation.[3,4] CRP is a protein which is formed during an acute inflammatory process, predominantly by the liver. A positive test result suggests the presence, not the cause, of an acute inflammatory reaction. The synthesis of CRP is initiated by antigen-immune complexes, bacteria, fungi, and trauma. Monitoring the levels of CRP in patients' sera indicates the effectiveness of treatment and the assessment of patient recovery.[5]

The CRP test is a more sensitive and rapidly responding indicator than the erythrocyte sedimentation rate.[2] This test is also useful in evaluating patients with an acute myocardial infarction. In such cases, the level of CRP correlates with peak levels of the MB isoenzyme of creatine kinase, but CRP peaks occur 1 to 3 days later. Failure of CRP to normalise may indicate ongoing damage to the heart tissue. Levels are not elevated in patients with angina.[6]

The minimum detection level is 2 mg/L.

3. Test Principle

The NADAL® CRP QUANT Test (whole blood/ serum/ plasma) detects CRP quantitatively via interpretation of the test line's colour intensity. The NADAL® CRP QUANT Test is an immuno-chromatographic test based on two specific antibodies against human CRP. The concentration-dependent formation of the test lines allows a rapid quantitative determination of CRP in whole blood/serum/plasma samples.

The test sample, diluted with buffer solution, is applied to the test cassette. The sample then migrates along the test strip from bottom to top. If the test sample contains CRP, it attaches to the first anti-CRP antibody, which is conjugated to red colloidal gold for colour marking. The red CRP antibody-gold complex, along with the sample liquid, diffuses through the membrane that is precoated with a line of the second anti-CRP antibody. The CRP-antibody-gold complex is immobilised by antibodies precoated on the membrane, leading to the formation of red lines. The CRP concentration correlates with the colour intensity of the test line and increases from 2 mg/l to 150 mg/l.

The control line serves as a procedural control and confirms sufficient specimen volume, adequate membrane wicking and correct procedural technique.

4. Reagents and Materials Supplied

- 20 NADAL® CRP QUANT test cassettes
- 20 end-to-end capillaries (5 µL)
- 20 extraction tubes with buffer
- 1 lot-specific RFID card
- 1 package insert

5. Additional Materials Required

- nal von minden Colibr*i*
- Lancets (only for whole blood obtained by fingerstick)
- Capillary holder
- Timer, in case the user does not use the internal timer in the nal von minden Colibr*i*

6. Storage & Stability

The kit should be stored at 2-30°C until the expiry date printed on the sealed pouch. The test must remain in the sealed pouch until use. Do not freeze. Do not use beyond the expiration date. Care should be taken to protect the components of the kit from contamination. Do not use if there is evidence of microbial contamination or precipitation. Biological contamination of dispensing equipment, containers or reagents can lead to false results.

7. Warnings and Precautions

- For professional *in-vitro* diagnostic use only.
- Read the entire procedure carefully prior to testing.
- Do not use beyond the expiry date.
- Do not use the test if the foil pouch is damaged.
- Do not reuse tests.
- Do not spill the sample into the reaction zone (result field).
- In order to avoid contamination, do not touch the reaction zone (result field) of the device.
- Avoid cross-contamination of specimens by using a new specimen collection container for each specimen obtained.
- Do not interchange or mix reagents from different lots.
- Do not eat, drink or smoke in the area where the specimens and kits are handled.
- Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are assayed.
- Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout the procedure and follow standard procedures for proper disposal of specimens.
- This kit contains products of animal origin. Certified knowledge of the origin and/or sanitary state of the animals does not completely guarantee the absence of transmissible pathogenic agents. It is therefore recommended that these products be treated as potentially infectious, and handled observing usual safety precautions (e.g. do not ingest or inhale).
- Humidity and temperature can adversely affect results.
- Used testing materials should be discarded according to local regulations.

8. Specimen Collection and Preparation

Preparation

Before performing the test, ensure that all components are brought to room temperature (see "Storage & Stability"). Take

an extraction tube with buffer solution out of the kit. Label it with the patient's name or ID.

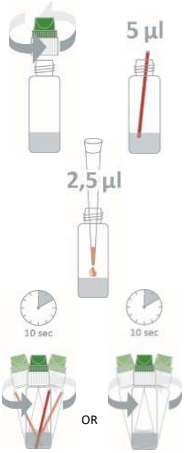
Obtaining a blood sample

1. Disinfect the fingertip. Extract a drop of blood from the fingertip using a lancet.
2. Using the capillary tube supplied, collect a volume of 5 µL from the blood drop. It is important that the end-to-end capillary is filled to the upper end. For hygiene reasons, hold the capillary with a capillary holder or tweezers. Alternatively, the blood can also be collected using a micropipette.

Note: When using micropipettes or other capillaries, a sample volume of exactly 5 µl must be acquired.

To avoid clotting, dilute the blood sample immediately.

Sample dilution / Sample stability



1. Hold the extraction tube upright and unsrew the white cap. Place the blood-filled end-to-end capillary into the extraction tube with dilution buffer. Alternatively, 5 µl of blood can be added directly with a micropipette into the buffer.

   OR

   Using a micropipette, transfer 2.5 µL of serum/plasma into the extraction tube containing dilution buffer.
2. Close the tube and firmly shake it by hand for approximately 10 seconds so that the blood is released from the capillary and the sample and dilution buffer are well mixed.

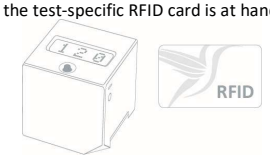
   The sample can then be used immediately or stored for up to 8 hours.

Note: EDTA, citrate or heparin blood can also be used. Before performing the test, it should be diluted accordingly with the supplied buffer.

9. Test Procedure

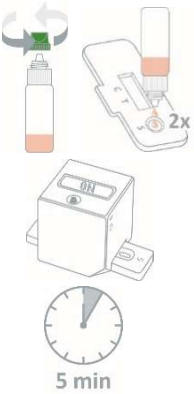
I. Preparation

1. Bring the pouch and buffer to room temperature (15-30°C) before use.
2. Remove the NADAL® CRP QUANT Test from its sealed pouch and use it as soon as possible. Best results will be obtained if the test is performed immediately after opening the foil pouch.
3. Switch on the nal von minden Colibr*i* and make sure that the test-specific RFID card is at hand.



Note: Every lot has its own calibration data. This is saved on a RFID card delivered with every test package. In order to correctly interpret the test, the lot-specific RFID card must be placed on the nal von minden Colibr*i*. To avoid confusion between cards, old RFID cards should be disposed of once tests from the corresponding lot have been used up.

II. Test Procedure



1. Unscrew the extraction tube's green cap and add 2 drops of the diluted sample (approximately 100 µL) to the specimen well of the test cassette. Make sure you hold the extraction tube vertically.

   Avoid trapping air bubbles in the specimen well.
2. Start the timer or use the integrated timer in the nal von minden Colibr*i*.
3. Place the nal von minden Colibr*i* onto the test cassette, so that it fits exactly into the cavity.
4. Start the measurement after exactly 5 minutes.

10. Result Interpretation

The nal von minden Colibr*i* shows the quantitative result following an analysis on the display.

The disease severity can be classified on the basis of the CRP concentration:

- Low grade inflammation (>3-10 mg/L). Possible causes: obesity, diabetes mellitus type 2 and atherosclerotic cardiovascular diseases.
- Mild inflammation (>10-40 mg/L). Possible causes: local abscess, mild operative or accident trauma, heart attack, deep vein thrombosis, inactive rheumatic diseases, metastasised malignant tumour and isolated viral infections.
- Moderate inflammation (>40-100 mg/L). Possible causes: severe inflammatory processes like purulent cystitis, bronchitis, dental suppuration, urinary tract infections and genital infections.
- High grade inflammation (>100 mg/L). Possible causes: acute generalised bacterial or fugal infections (sepsis) and severe tissue injury following polytrauma or major surgical procedures.[7]

Measurement range: 2 to 150 mg/l.

Invalid result

Control line fails to appear.

In this case the result is invalid, even if a test line appears. The nal von minden Colibr*i* will also display this result. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test device. If the problem persists, discontinue using the test kit immediately and contact your distributor.

11. Calibration

The NADAL® CRP QUANT Test was calibrated with human CRP standard (BBI Solutions) in human plasma and validated against the international human CRP reference standard WHO 85/506. The calibration data is saved on the included RFID

chip. It is therefore not necessary for the user to calibrate the device.

12. Quality Control

Internal procedural controls are included in the NADAL® CRP QUANT. A coloured line appearing in the control region (C) is considered an internal positive procedural control, confirming sufficient specimen volume and correct procedural technique. Control standards are not supplied with the NADAL® CRP QUANT kit. Nevertheless, it is recommended that positive and negative controls are tested as a good laboratory practice with every new lot or delivery or once a week and according to the laboratory's standard procedure, in order to confirm the test procedure and to verify proper test performance. Control material should be tested as with patient samples. We therefore offer the following controls:

Positive control Level 1 and 3 Article number. 311011

Furthermore, you can verify the correct functionality of the device with the included QC cassette. For detailed information please consult the instruction manual of the device.

13. Limitations

- The NADAL® CRP QUANT Test (whole blood/ serum/ plasma) is for professional *in-vitro* diagnostic use and should only be used for the quantitative detection of CRP.
- CRP is not a specific marker for a certain disease. As with all *in-vitro* diagnostic devices, the result should not be interpreted on its own but in correlation with clinical findings. A CRP increase often occurs before any symptoms become apparent, and so temporal connections should also be taken into consideration.
- Intra-individual variation in CRP values is relatively high. In general, values >10 µg/mL can be regarded as elevated in the majority of patients.
- Clinical diagnosis should not be based on the result of the NADAL® CRP QUANT Test only. The full clinical context of the patient should be included when making a diagnostic decision, taking into account the clinical signs and other relevant information.
- Due to the heterogeneity of commercially available standard materials, the sensitivity of the assay with different standards varies.
- In rare cases, auto-antibodies in the patient's blood prevent the antigen-antibody reaction in the test by blocking the binding sites. This can lead to false-negative test results. Please note that these problems can generally occur in all test methods, where the detection of a protein through an antibody reaction occurs.

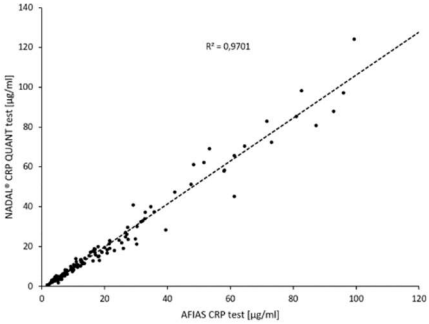
14. Performance Characteristics

Analytical Sensitivity

The detection limit of the assay is 2 mg CRP/L sample. Standard BBI solution materials are used for the periodic review of minimum sensitivities. Please note that due to the heterogeneity of commercially available standard materials, the sensitivity of the test can vary slightly when using different standards.

Accuracy

In a comparative study using a fluorescence-based quantitative rapid test (AFIAS CRP), a coefficient of determination (R^2) of 0.97 was determined for 148 patient plasma samples using regression analysis.



Inter- and Intra-batch inspection

The intra- and inter-batch variation of the assay was determined by three independent batches tested with CRP concentrations of 2 mg/L, 20 mg/L and 150 mg/L investigated in a 10x determination. The intra-batch variation was ≤15% in all concentration ranges. The inter-batch variation was <5%. The variation was <6% when tested on different days. The variation was <11% when tested by different operators and at different sites.

Hook effect

The NADAL® CRP QUANT Test can quantitatively determine CRP concentrations between 2 mg/L and 150 mg/L with the nal von minden Colib*ri*. No test line is visible for values below 2 mg/L.

Up to a concentration of 500 mg/L CRP, no hook effect can be observed.

Interferences

The same control was diluted in whole blood, serum and plasma. No matrix effect between the single matrices could be observed.

The following substances did not show any interference with the NADAL® CRP QUANT Test in the following concentrations: acetylsalicylic acid, 200 mg/L; ascorbic acid, 200 mg/L; caffeine, 200 mg/L; creatinine, 200 mg/L; glucose, 20000 mg/L, hemoglobin, 5000 mg/L; penicillin G, 400 mg/L; bilirubin, 1000 mg/L.

15. References

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