CRP U-hs*

Diagnostic reagent for quantitative in vitro determination of C-reactive protein (CRP) in serum or plasma on photometric systems

Order Information

Cat. No.	Kit size						
1 7045 99 10 930	R1	3 x	20 mL	+	R2	3 x	20 mL

Calibrator set for universal range (5 levels)

1 7040 99 10 059	5 x	1 mL	TruCal CRP U

Calibrator set for high sensitive range (5 levels)

1 7080 99 10 059	5 x	1 mL	TruCal CRP hs

Summary [1-4]

C-reactive protein (CRP) is the best known among the acute-phase proteins, a group of proteins whose concentration increases in blood as a response to inflammatory disorders (acute-phase response). CRP is normally present in low concentration in blood of healthy individuals (< 5 mg/L). It increases already after 6 hours in acute inflammatory processes associated with bacterial infections, post-operative conditions or tissue damage. During the disease CRP concentration can get as high as 500 mg/L. The measurement of CRP represents an important laboratory test for detection of acute infection as well as for monitoring inflammatory processes also in acute rheumatic and gastrointestinal diseases. CRP testing shows various advantages in comparison to the erythrocyte sedimentation rate (ESR) and the leukocyte count. In fact, it is more sensitive, the increase occurs earlier and its levels return to the reference range more rapidly after healing.

Method

Particle enhanced immunoturbidimetric test with two applications. The high sensitive application is recommended for samples with concentrations lower than 20 mg/L and where high precision and extremely good sensitivity is required (measuring range of hs application: 0.05 mg/L – 20 mg/L). The universal application is characterized by extraordinary wide measuring range (0.3 – 350 mg/L) and low sample volume.

Principle

Determination of the concentration of CRP by photometric measurement of antigen-antibody reaction of antibodies to human CRP bound to polystyrene particles with CRP present in the sample.

Reagents

Components and Concentrations

R1:	HEPES pH 7.2	10 mmol/L
R2:	Borate buffer	4.6 mmol/L
	Polyclonal (goat) and monoclonal (mouse) anti-human CRP antibodies bound to carboxylated polystyrene particles	

Storage Instructions and Reagent Stability

The reagents are stable up to the end of the indicated month of expiry, if stored at 2 – 8°C and contamination is avoided. Do not freeze the reagents and protect them from light!

Warnings and Precautions

1. The reagents contain sodium azide (0.95 g/L) as preservative. Do not swallow! Avoid contact with skin and mucous membranes.
2. In very rare cases, samples of patients with gammopathy might give falsified results [9].
3. Heterophile antibodies in patient samples may cause falsified results.
4. Please refer to the safety data sheets and take the necessary precautions for the use of laboratory reagents. For diagnostic purposes, the results should always be assessed with the patient`s medical history, clinical examinations and other findings.
5. For professional use only!

Waste Management

Please refer to local legal requirements.

Reagent Preparation

The reagents are ready to use. Do not shake and avoid foaming.

Materials required but not provided

NaCl solution 9 g/L
General laboratory equipment

Specimen

Serum, heparin plasma or EDTA plasma

Stability [5]:			
	15 days	at	20 – 25°C
	2 months	at	4 – 8°C
	3 years	at	–20°C

Only freeze once!
Discard contaminated specimens.

Reference Range [6,7]

Adults	< 5 mg/L
Newborns up to 3 weeks	< 4.1 mg/L
Infants and children	< 2.8 mg/L

Each laboratory should check if the reference ranges are transferable to its own patient population and determine own reference ranges if necessary.

Literature

1. Thompson D, Milford-Ward A, Whicher JT. The value of acute phase protein measurements in clinical practice. Ann Clin Biochem 1992;29:123-31.
2. Gabay C, Kushner I. Acute-phase proteins and other systemic responses to inflammation. N Engl J Med 1999;340:448-54.
3. Hansson LO, Lindquist L. C-reactive protein: its role in the diagnosis and follow-up of infectious diseases. Curr Opin Infect Diseases 1997; 10:196–201.
4. Sipe JD. Acute-phase proteins in osteoarthritis. Semin Arthritis Rheum 1995;25: 75–86.
5. Guder WG, Zawta B et al. The Quality of Diagnostic Samples. 1st ed. Darmstadt: GIT Verlag; 2001. p. 24-5.
6. Dati F, Schumann G, Thomas L, Aguzzi F, Baudner S, Bienvenu J et al. Consensus of a group of professional societies and diagnostic companies on guidelines for interim reference ranges for 14 proteins in serum based on the standardization against the IFCC/BCR/CAP reference material (CRM 470). Eur J Clin Chem Clin Biochem 1996;34:517-20.
7. Schlebusch H, Liappis N, Klein G. High sensitive CRP and creatinine: reference intervals from infancy to childhood. Poster presented at AACC/CSCC; July/August 2001, Chicago, Illinois.
8. Young DS. Effects of Drugs on Clinical Laboratory Tests. 5th ed. Volume 1 and 2. Washington, DC: The American Association for Clinical Chemistry Press 2000.
9. Bakker AJ, Mücke M. Gammopathy interference in clinical chemistry assays: mechanisms, detection and prevention. ClinChemLabMed 2007;45(9):1240–1243.

Universal application

Assay Procedure for Analyzers

Application sheets for automated systems are available on request.

Basic parameter for Hitachi 911

Wavelength	800/505 nm (bi-chromatic)
Temperature	37°C
Measurement	2-Point Test (Fixed Time Kinetics)
Sample/calibrator	3 µL
Reagent 1	150 µL
Reagent 2	150 µL
Addition Reagent 2	Cycle 16 (320 s)
Absorbance 1	Cycle 19 (380 s)
Absorbance 2	Cycle 31 (620 s)
Calibration	spline

Calculation

The CRP concentration of unknown samples is derived from a calibration curve using an appropriate mathematical model such as spline. The calibration curve is obtained with five calibrators at different levels and NaCl solution (9 g/L) for determination of the zero value. Stability of calibration:
4 weeks

Calibrators and Controls

For calibration the DiaSys TruCal CRP U calibrator set is recommended (order information see above). The assigned values of the calibrators have been made traceable to the IFCC reference material ERM®-DA474. DiaSys TruLab CRP or TruLab Protein control should be assayed for internal quality control. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat. No.	Kit size
TruLab CRP level 1	5 9600 99 10 045	3 x 2 mL
TruLab CRP level 2	5 9610 99 10 045	3 x 2 mL
TruLab Protein 1	5 9500 99 10 046	3 x 1 mL
TruLab Protein 2	5 9510 99 10 046	3 x 1 mL

*U-hs: universal and high sensitive

Performance Characteristics

Measuring range

The measuring range is from 0.3 mg/L up to the concentration of the highest calibrator, at least up to 350 mg/L. When values exceed these ranges samples should be diluted 1 + 1 with NaCl solution (9 g/L) and the result multiplied by 2.

Prozone Limit

No prozone effect was observed up to a CRP concentration of 1000 mg/L.

Specificity/Interferences

Due to its antibodies DiaSys CRP U-hs is a specific immunoassay for human CRP. At a CRP level of 1.0 mg/L interference by lipemia is < 10% up to 2000 mg/dL triglycerides (Intralipid). No interference has been observed up to levels of 700 IU/mL RF, 40 mg/dL bilirubin and 1000 mg/dL hemoglobin. For further information on interfering substances refer to Young DS [8].

Sensitivity/Limit of Detection

The lower limit of detection is 0.3 mg/L.

Precision

Intra-assay precision n=20	Mean [mg/L]	SD [mg/L]	CV [%]
Sample 1	1.03	0.04	3.9
Sample 2	2.08	0.05	2.5
Sample 3	222	4.35	2.0

Inter-assay precision n=20	Mean [mg/L]	SD [mg/L]	CV [%]
Sample 1	2.24	0.04	1.9
Sample 2	24.6	0.29	1.2
Sample 3	233	7.84	3.4

Total precision according to protocol EP-5 of the NCCLS (National Committee of Clinical Laboratory Standards):

Inter-assay precision n=80	Mean [mg/L]	SD [mg/L]	CV [%]
Sample 1	24.6	0.48	2.0
Sample 2	233	8.38	3.6

Method Comparison

A comparison of DiaSys CRP U-hs FS with universal application (y) to a nephelometric test (x) using 111 samples gave following results:
y = 1.06 x + 0.07 mg/L; r = 0.992

A comparison of DiaSys CRP U-hs with universal application (y) to a commercially available immunoturbidimetric test (x) using 78 samples gave following results: y = 1.03 x + 0.34 mg/L; r = 0.998

High sensitive application

Assay Procedure for Analyzers

Application sheets for automated systems are available on request.

Basic parameter for Hitachi 911

Wavelength	800/505 nm (bichromatic)
Temperature	37°C
Measurement	2-Point Test (Fixed Time Kinetics)
Sample/calibrator	15 µL
Reagent 1	150 µL
Reagent 2	150 µL
Addition Reagent 2	Cycle 16 (320 s)
Absorbance 1	Cycle 19 (380 s)
Absorbance 2	Cycle 31 (620 s)
Calibration	spline

Calculation

The CRP concentration of unknown samples is derived from a calibration curve using an appropriate mathematical model such as spline. The calibration curve is obtained with five calibrators at different levels and NaCl solution (9 g/L) for determination of the zero value. Stability of calibration:
4 weeks

Calibrators and Controls

For calibration, the DiaSys TruCal CRP hs calibrator set is recommended (order information see above). The assigned values of the calibrators have been made traceable to the IFCC reference material ERM®-DA474.
For internal quality control, a DiaSys TruLab CRP hs control should be assayed with each batch of samples. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat. No.	Kit size
TruLab CRP hs Level 1	5 9730 99 10 046	3 x 1 mL
TruLab CRP hs Level 2	5 9740 99 10 046	3 x 1 mL

Performance Characteristics

Measuring range

Multi-point calibration: The measuring range is from 0.05 mg/L up to the concentration of the highest calibrator, at least up to 20 mg/L. When values exceed these range samples should be diluted 1 + 1 with NaCl solution (9 g/L); the result multiplied by 2.

Prozone Limit

No prozone effect was observed up to a CRP concentration of 800 mg/L.

Specificity/Interferences

Due to its antibodies DiaSys CRP U-hs is a specific immunoassay for human CRP. At a CRP level of 0.70 mg/L interference by lipemia is < 10 % up to 1200 mg/dL triglycerides (Intralipid). No interference has been observed up to 700 IU/mL RF, up to 40 mg/dL bilirubin and up to 1000 mg/dL hemoglobin. For further information on interfering substances refer to Young DS. [8].

Sensitivity/Limit of Detection

The lower limit of detection is 0.05 mg/L.

Precision

Intra-assay precision n=20	Mean [mg/L]	SD [mg/L]	CV [%]
Sample 1	0.37	0.01	2.5
Sample 2	1.21	0.02	1.3
Sample 3	17.5	0.47	2.7

Inter-assay precision n=20	Mean [mg/L]	SD [mg/L]	CV [%]
Sample 1	0.68	0.01	1.3
Sample 2	2.37	0.02	1.0
Sample 3	10.7	0.10	1.0

Total precision according to protocol EP-5 of the NCCLS (National Committee of Clinical Laboratory Standards):

Inter-assay precision n=80	Mean [mg/L]	SD [mg/L]	CV [%]
Sample 1	2.37	0.04	1.7
Sample 2	10.7	0.13	1.2

Method Comparison

A comparison of DiaSys CRP U-hs FS with high sensitive application (y) to a nephelometric test (x) using 59 samples gave following results:
y = 0.99 x + 0.01 mg/L; r = 0.990

A comparison of DiaSys CRP U-hs FS with high sensitive application (y) to a commercially available test (x) using 59 samples gave following results:
y = 0.99 x – 0.06 mg/L; r = 0.994

Manufacturer

IVD CE

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