

C-Reactive Protein (CRP)

WHAT IS C-REACTIVE PROTEIN (CRP)?

C-reactive protein (CRP) is a protein in the blood that non-specifically increases during inflammation and infection, as well as following a heart attack, surgery, or trauma. In many instances, tissue damage causes a significant spike in the blood concentration of CRP. However, even just minimal but persistent levels of inflammation result in small CRP increases, which are associated with an increased risk of cardiovascular disease.

PURPOSE OF A CRP TEST

CRP measurements are useful for detecting inflammation within the body. High sensitivity assays for CRP (such as offered here) can detect small increases in CRP and are generally used to:

- Determine the risk of cardiovascular disease
- Evaluate the risk of second heart attack

However, very high CRP values (above 5–10 mg/L) can also be detected in this high sensitivity assay. Very high values are a sign of various inflammatory issues, including:

- Acute infection
- Arthritis (e.g., rheumatoid arthritis that affects the joints)
- Specific cancers (e.g., lymphoma)
- Diseases of the immune system (e.g., lupus)
- Inflammatory bowel disease

CRP assays can also be beneficial to determine how well a treatment is working, such as treatment for cancer or a bone infection.

CRP REFERENCE RANGES

CRP levels between 1.00 and 3.00 mg/L are associated with an average risk of cardiovascular disease. Lower levels (< 1.00 mg/L) decrease the risk of cardiovascular disease, while higher levels (> 3.00 mg/L) are associated with an increased risk of cardiovascular disease. These ranges were obtained from Pearson et al. (2003) from the Centers for Disease Control and Prevention and American Heart Association (1). Values above 5 mg/L are more commonly associated with acute infection, active arthritis, or other inflammatory illness.

ELEVATED CRP AND CARDIOVASCULAR HEALTH

There are numerous risk factors associated with cardiovascular disease, including high cholesterol, high blood pressure, being overweight, and diabetes. However, many individuals who develop cardiovascular disease do not appear to have any of the obvious risk factors (2).

The development of an hs-CRP assay has allowed for the identification of individuals that have CRP levels within the higher end of the reference range, whom are not identified in standard wide-range CPR assays. These slightly elevated CRP levels in otherwise healthy individuals are indicative of the development of atherosclerosis (cholesterol deposits and plaque in the blood vessel walls), and help to predict the future risk of heart attack, stroke, and peripheral artery disease (3).

In addition, measurements of CRP are useful in patients who have already suffered a myocardial infarction. Elevated CRP in these patients is associated with subsequent risk of major adverse cardiovascular events and death (4).

LOWERING CRP

Non-pharmacological methods for reducing CRP include aerobic exercise, abstaining from smoking, losing excess body weight, and following a heart-healthy diet with whole grains, reduced unhealthy fats and sodium, and lots of fruits and vegetables. Various medications are also available that have been shown to reduce CRP levels, including statins, aspirin, and vitamin E (5).

TEST PROCEDURE

Correct specimen collection and handling is required for optimal assay performance.

This test requires a blood sample from a finger prick. All supplies for sample collection are provided in this kit. First wash and dry hands. Warm hands aid in blood collection. Clean the finger prick site with the alcohol swab and allow to air dry. Use the provided lancet to puncture the skin in one quick, continuous and deliberate stroke. Wipe away the first drop of blood. Massage hand and finger to increase blood flow to the puncture site. Angle arm and hand downwards to facilitate blood collection on the fingertip. Drip blood onto the blood collection card or into the microtainer tube.

Avoid squeezing or 'milking' the finger excessively. If blood flow stops, perform a second skin puncture on another finger, if more blood is required. Do not touch the fingertip.

Dispose of all sharps safely and return sample to the laboratory in the provided prepaid return shipping envelope.

Upon receipt at the laboratory, the blood sample is analyzed by the fully automated Alinity c CRP Vario assay on the Alinity ci series analyzer. This high sensitivity assay determines CRP levels using turbidimetric/immunoturbidimetric methodology, where the concentration of CRP in the blood sample is proportional to the agglutination and absorbance change occurring when CRP in the sample binds to anti-CRP antibodies.

TEST INTERPRETATION

This assay will provide an accurate CRP level for the tested blood specimen. CRP levels between 1.00 and 3.00 mg/L are associated with an average risk of cardiovascular disease. Lower levels (< 1.00 mg/L) decrease the risk of cardiovascular disease, while higher levels (> 3.00 mg/L) are associated with an increased risk of cardiovascular disease. These ranges were obtained from Pearson et al. (2003) from the Centers for Disease Control and Prevention (CDC) and American Heart Association (1). Values above 5 mg/L are more commonly associated with acute infection, active arthritis, or other inflammatory illness.

DISCLAIMERS/LIMITATIONS

Various factors can affect CRP levels and affect the interpretation of baseline CRP values. These include NSAIDs, statins, hormone therapy, other chronic inflammation (e.g., arthritis), recent strenuous exercise, pregnancy, obesity, smoking, liver failure, and recent illness, injury, or infection.

These results should be interpreted in conjunction with other laboratory and clinical information. Additional testing is recommended if CRP levels are inconsistent with clinical evidence.

Correct specimen collection and handling is required for optimal assay performance.

This CRP assay is not a substitute for traditional cardiovascular risk factors, and should not be used solely for acute coronary syndrome management.

Gammopathy, particularly of the monoclonal IgM type may interfere with this assay.

The average of two CRP results, repeated optimally two weeks apart, should be used on metabolically stable individuals.

REFERENCES

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- (4) Carrero JJ, et al. (2019). hsCRP Level and the Risk of Death or Recurrent Cardiovascular Events in Patients with Myocardial Infarction: a Healthcare-Based Study. *JAHA*. 8.
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