C-Reactive Protein (CRP) Latex Agglutination Test

Objectives

1. State the clinical significance of elevated C-reactive protein (CRP) levels.
2. List three conditions in which CRP is elevated in patient serum.
3. State three advantages that the CRP test has over the erythrocyte sedimentation rate.
4. Describe “postzone” as it applies to the CRP test procedure.
5. Select specimens for acceptability for CRP testing.
6. Interpret CRP latex agglutination tests with 100% accuracy.
7. Record results of the controls and patients accurately.

Introduction

CRP was named because it was first discovered as a substance in the serum of patients with acute inflammation that reacted with the C-(capsular) polysaccharide of pneumococcus. CRP is an acute phase protein.

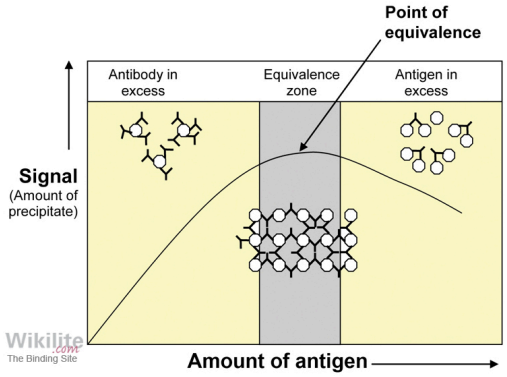
Increased C-reactive protein (CRP) is an indicator of inflammation or necrosis in the tissues. It is manufactured by the liver and released into the plasma during many necrotic, inflammatory or infectious diseases including myocardial infarction (MI), active rheumatic fever, and pneumococcal pneumonia. CRP disappears rapidly from the blood after recovery from the disease state. CRP is not present in the serum of healthy individuals. The presence of CRP in a patient with MI or rheumatic fever is considered the most sensitive indicator of necrosis and inflammation.

CRP has several advantages over the erythrocyte sedimentation rate (ESR) including:

- It is abnormally elevated immediately whereas ESR determinations may be borderline and may remain elevated in the absence of inflammation.
- CRP is not affected by anemia, where ESR will be falsely elevated.
- Abnormal serum proteins do not affect CRP results as an ESR.

Although it is not a diagnosis tool for any particular disease, the level of CRP in serum indicates the intensity of the disease, the response of the patient to treatment, and can be used to monitor patient progress.

Tests for the detection of CRP may give a false negative in cases where CRP is present in a large amount. In this test system, CRP is the antigen; anti-CRP is coated on the latex particles. If all antigen binding sites of the antibody are bound to a single CRP molecule there are no sites left to bind to an antigen bound on an adjacent antibody molecule. Lattice formation cannot occur. This phenomenon is called “postzone”. To prevent a false negative due to postzone some manufacturers recommend testing a sample diluted AND undiluted. If either sample gives a positive result the result is “positive”. Review the illustration below.



Principle
When latex particles coated with human anti-CRP are mixed with a patient's serum containing C - reactive proteins, an agglutination reaction will take place. Agglutination indicates the presence of CRP, no agglutination indicates CRP is not present or is not present in a sufficient quantity to be detected by the test.

M**aterials**
1. C - Reactive Protein test kit
2. Patient serum specimens
3. Digital/Electronic Timer

Procedure
See reagent package insert for kit utilized.

Interpretation
Agglutination of latex particles is considered a positive reaction, indicating the presence of C-reactive protein at a significant and detectable level. Specimens, which do not contain human CRP, will not cause agglutination. Consult the reagent product insert(s) for specific information.

If agglutination of the latex particles occurs, the result is positive. If controls do not give expected reactions, the test is invalid and must be repeated.

Expected Results
Consult the reagent product insert(s) for interpretation.

Limitations of the Procedure
1. Specimens with markedly high CRP levels may demonstrate postzone (antigen excess) effect, which will cause a false negative test result. Therefore, some manufacturer's recommend diluting the specimen prior to testing. Consult product literature.
2. Patients with high titers of rheumatoid factors may give positive results. It is recommended that patients suspected with RA be tested for presence of rheumatoid factors. Procedure must be followed carefully and results read at the appropriate time.
3. Reading after the specified time may result in misinterpretation due to drying of specimen and reagents.
4. A semi-quantitative titration procedure on positive specimens is required to observe increasing or decreasing levels. Consult product literature.
5. Avoid contamination of reagent or reagent dispensing dropper as this may cause erroneous test results in future tests.

Consult package insert for additional limitations.

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Name _____ Date _____

Kit Information	
Test Kit Name	
Manufacturer	
Lot Number	
Expiration Date	
Package insert revision date	
Storage temperature	

***State the interpretation (i.e. positive or negative)

Patient Name	Identification Number	Interpretation
1.		
2.		
CONTROLS		
	POSITIVE	
	NEGATIVE	

INSTRUCTOR USE ONLY	Possible	Awarded
Reported patient results with 100% accuracy	10	
Student results matched instructor results for controls	10	
No clerical errors or inaccurate information provided.	10	
Total Points	30	

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Name _____ Date _____

Points: 15

1. Based on the control results, can these patient results be reported? (**circle one**) Yes No
   If "no", explain why. (1 point)

2. What do high levels of CRP indicate for a patient? (1 point)

3. List three (3) diseases (not conditions) where elevated levels of CRP are found in the patient's serum. (1 points)
   a.
   b.
   c.

4. Name the substance coating the latex particles. (1 point)

5. State three (3) advantages that the CRP test has over ESR. (3 points)
   a.

   b.

   c.

6. **According to the product insert list** the type(s) of sample(s) which may be used for this test. (1 point)

7. Why do some manufacturers recommend testing specimens diluted and undiluted? (1 point)

8. Describe the phenomenon known as "postzone"? (1 point)

9. List two limitations of this procedure. (2 points)
   a.

   b.

10. After reviewing the product insert state the principle of this test kit **including the appearance of positive and negative reactions.** (3 points)