

*Original Article*

## The most important tests that help diagnose joint patientssuch as the rheumatoid Arthritis

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### Abstract

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Rheumatoid arthritis is the autoimmune diseases, occurs, when the body fail to differentiate between the itself and non-self-tissue, immune system which causes attack to own body tissue, and the most important signs and symptoms are Joint pain, swelling, fatigue, warmth around a join and in the laboratory diagnosis purification of anemia, about 0.5-1% of the population world-wide by effected rheumatoid arthritis, with peak prevalence between the ages of 30 and 50 years, the most commonly diagnosed systemic rheumatoid arthritis, in women ratio 3:1 men, the likelihood of a rheumatoid arthritis diagnosis increases with the number of small joints involved synovial joint with progressive to several joints, there are a number of possible that may increases your risk of developing rheumatoid arthritis, including smoking, genetics and hormones, diagnosis include having at least one joint with definite swelling that is not explained by another disease, in a patient with inflammatory arthritis, the presence of a rheumatoid factor or anti-citrullinated protein antibody, or elevated C-reactive protein level or erythrocyte sedimentation rate suggests a diagnosis of rheumatoid arthritis, initial laboratory evaluation should also include complete blood count with differential combinations of treatment are often used to control the disease, included medical therapy, diet therapy and surgical therapy.

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**Key points** :Autoimmune diseases, Rheumatoid arthritis, Eextracellular matrix, Complete Blood Count, Erythrocyte Sedimentation Rate, C-reactive protein, Rheumatoid factor, Anti-cyclic citrullinated peptide, Anti- Nuclear Antibody

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## Introduction :

Rheumatoid arthritis (RA) is the autoimmune disease, autoimmune diseases are pathological conditions identified by abnormal autoimmune responses, about 5% of the population worldwide are affected by Autoimmune diseases. (Ganguly et al. 2012)

Autoimmune disease (AD) occur when the body fails to differentiate between the self and non self-tissue, immune system which causes attack to own body tissue, the main functions of the immune system are to defend the body from germs and other foreign invaders, the causes of AD involved environmental factors that have been found to have influence are infectious agents, stress, sex hormonal

(estrogens and androgens), and cigarette smoking.(Viswanath. 2013)

There are more than 80 to 100 diseases affecting by autoimmune diseases, AD can be placed into two general types: those that are localized to specific organs or tissues and those that are systemic and damage many organs or tissues. (Lowry. 2016)

The first discovered Rheumatoid Arthritis in 1880 by Dr. Uckstein Jacob Landry-Biafuis (1772-1840). (Scott et al.1987)

The causes of rheumatoid arthritis are not yet known, and the causes remain unknown as in many cases of other autoimmune diseases, several studies have

## Types of Synovial Joints :-

- 1) The pivot joint: is found at the top of the spine (atlas and axis bones) and allows rotation of the neck.
- 2) Gliding joints: such as the ones between the carpals of the wrist, are found where bones meet as flat surfaces and allow for the bones to glide past one another in any direction.
- 3) Hinge joints: such as the elbow and knee limit movement in only one direction so that the angle between bones can increase or decrease at the joint the limited motion at hinge joints provides for more strength and reinforcement from the bones, muscles, and ligaments that make up the joint.

- 4) Saddle joints: such as the one between the first metacarpal and trapezium bone, permit 360 degree motion by allowing the bones to pivot along two axes.

The shoulder and hip joints: form the only ball and socket joints in the body these joints have the freest range of motion of any joint in the body they are the only joints that can move in a full circle and rotate around their axis however the drawback to the ball and socket joint is that its free range of motion makes it more susceptible to dislocation than less mobile joints.(bassert,thomas,cloville.2015) (saladin. 1998)

## Geographical spread in the world :

Results Meta-estimates of regional RA prevalence rates for countries of low or middle income were 0.40%, for Southeast Asian, 0.37% for Eastern Mediterranean, 0.62% , for European, 1.25%, for American and Western Pacific regions, 0.42% , A formal meta-analysis could not be performed for the sub-Saharan African region due women reached 0.75% , this difference between males and females was

statistically significant ,the prevalence of RA did not differ significantly between urban and rural settings , these prevalence estimates represent 2.60, million male sufferers and 12.21, million female sufferers in Low middle income countries (LMIC) in the year 2000, and 3.16 million affected males and 14.8 of million affected females in LMIC in the year 2010. (Rudan et al.2015)

## The most common tests of rheumatoid arthritis :

### Complete Blood Count :



Illustrate (7) Complete Blood Count

The complete blood count determines the WBC (white blood cell count), RBC (red blood cell count), hemoglobin, hematocrit, several red blood cell indices, and the platelet count, elevated white blood cell counts suggest the possibility of an active infection patients taking corticosteroids may have an elevated WBC due to the medication chronic inflammation can

cause a low red blood cell count, low hemoglobin and hematocrit may be indicative of anemia associated with chronic diseases or possible bleeding caused by medications, the platelet count is often high in rheumatoid arthritis patients, while some potent arthritis medications can cause platelets to be low. (Sokka. 2009)

### Parameters of CBC :

The complete blood count, or CBC, lists a number of many important values.

### Erythrocyte Sedimentation Rate:



**Illustrate (8) Erythrocyte Sedimentation Rate**

This test measure the level inflammation in the body by measuring how red blood cell cling together fall and settle (like sediment) in the bottom of a test tube over **C-reactive protein (CRP) :**

an hour, a high ESR suggests greater levels of inflammation in your body.(Wolfe,Michaud . 1994)



**Illustrate (9) C-reactive protein**

A CRP is non-specific test which can indicate inflammation anywhere in the body CRP is produced by the liver and released into the a bloodstream, high level of CRP in the blood is a sign that there may be an inflammatory process occurring in the body, inflammation itself isn't

typically a problem, but it can indicate a host of other health concerns, including infection, arthritis, kidney failure, and pancreatitis, high CRP levels may put patients at increased risk for coronary artery disease, which can cause a heart attack.(Pincus,Sokka. 2009)

A **CRP test** is a blood test designed to

measure the amount of CRP in the blood.

**Principle of CRP test :**

The C-Reactive Protein test is based on the principle of the latex agglutination, when latex particles complexes human anti-CRP are mixed with a patient's serum

containing C reactive proteins, an visible agglutination reaction will take place within 2 minutes.

**Procedure of CRP Test :**

• **Qualitative Test :**

- 1) Bring all reagents and serum sample to Room Temperature and mix latex reagent gently prior to use, do not dilute the controls and serum .
- 2) Place 1 drop of Serum, Positive control and Negative control on separate reaction circle on glass slide .

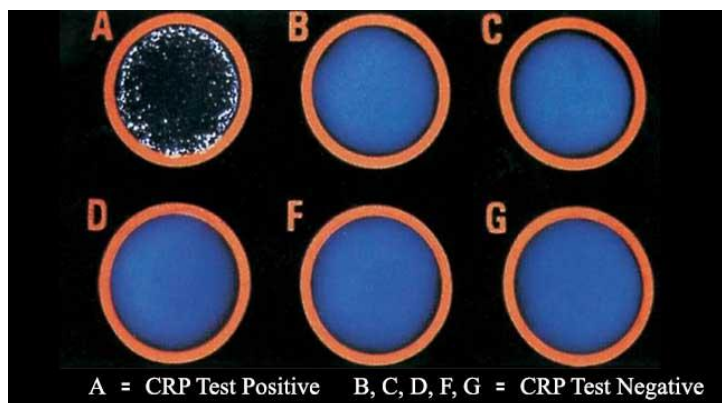
- 3) Then add 1 drop of CRP latex reagent to each of the circles .
- 4) Mix with separate mixing sticks and spread the fluid over the entire area of the cell.
- 5) Tilt the slide back and forth slowly for 2 minutes observing preferably under artificial light.
- 6) Observe for visible agglutination.(Macleod, Avery . 1951)(Singer, Plotz . 1951)

• **Semi-Quantitative Test :**

- 1) Prepare dilution of the specimen with physiological saline 0.9%.

- 2) Then proceed for each dilution as in qualitative test.

**Result Interpretation of CRP Test :**



**Illustrate (10) Result Interpretation of CRP Test**

- **Positive:** Agglutination of latex particles, indicating the presence of C – reactive protein at a significant and detectable level.
- **Negative:** No Agglutination.
- **RF are classification to :**

For Semi-Quantitative Test Results, the last dilution of serum with visible agglutination is the CRP titer of the serum.(Macleod,Avery . 1951)(Singer,Plotz . 1951)

- 1) RhF negative – when five or more joints are affected and Rheumatoid



factor antibody is not found on blood testing .

- 2) RhF positive – when five or more joints are affected and RhF is found on

- **Semi-quantitative method :**

- 1) Using isotonic saline prepare serial dilutions of the test sample positive in the qualitative method 1:2, 1:4, 1:8, 1:16,1:32, 1:64, 1:128.
- 2) For each specimen to be tested, add 100  $\mu$ L of 0.9% saline into test tubes numbered 1 to 5.

- **RF are classification to :**

- 1) RF negative – when five or more joints are affected and Rheumatoid factor (RhF) antibody is not found on blood testing.

**CHROMA RF and CRP Double Test :**



**Illustrate (12) I-CHROMA RF and CRP Double Test**

The most commonly used RA blood tests include rheumatoid factor and C-reactive protein, our RA double test can

blood testing .(Walker, pound, powell .1986)

- 3) Add 100  $\mu$ L of specimen onto test tube 1.
- 4) Mix the mixture, avoid formation of bubbles.
- 5) Transfer 100  $\mu$ L of mixed sample from tube 1 to 2.
- 6) Repeat this serial dilution procedure in tube 3 to 4, and then 5, Dispose 100  $\mu$ L from test tube 5 after mixing.
- 7) Tubes 1 to 5 now represent a dilution series as follows :

- 2) RF positive – when five or more joints are affected and RhF is found on blood testing. (Walker, pound, powel .1986)

measure RF(IgM and CRP simultaneously with one drop of fingertip blood within5 min.(ichrome)



**Illustrate (14)Bioplex anti-CCP.(Mouterde. 2014)**

Anti-cyclic citrullinated peptide (anti-CCP) is an antibody present in most rheumatoid arthritis patients, levels of anti-CCP can be detected in a patient through a blood test, a positive anti-CCP test result can be used in conjunction with other blood tests, imaging tests, and physical examinations to reach a rheumatoid arthritis diagnosis.(diagnosis\_anticcip)

A patient with rheumatoid arthritis who tests positive for anti-CCP in their blood has what's known as seropositive rheumatoid arthritis, this is as opposed to someone who has been diagnosed with rheumatoid arthritis but tests negative for anti-CCP antibodies and/or rheumatoid factor.(diagnosis\_anticcip)

Antibodies develop in our immune system to help the body fight infectious organisms, when an antibody recognizes the foreign proteins of an infectious organism, it recruits other proteins and cells to fight off the infection, this cascade of attack is called inflammation, some antibodies make incorrect cells, identifying a naturally-occurring protein (or self-protein) as foreign these autoantibodies start the cascade of inflammation, causing the body to attack itself, the presence of

large amount of autoantibodies or ANAs can indicate an autoimmune disease. (Marilina Toampoia, 2009)

The ANA test is used to screen for autoimmune disorders the ANA test may also be positive in other conditions, such as Sjogrens syndrome mixed connective tissue disease and rheumatoid arthritis analytic methods used to detect and measure ANA and specific autoantibodies to nuclear antigens. (Marilina Toampoia, 2009)

## Therapy:

### Diet therapy :

- 1) Avoid obesity.
- 2) Anti-inflammatory diet : vegetarian with omega 3 fatty acids (fatty fish/fish oils).
- 3) Essential fatty acids (evening primrose oil).
- 4) Anti-oxidants. (Visser)

### Surgical therapy :

Surgical intervention in patients with RA can achieve pain relief , deformity correction and functional improvement(Luqmani, Hennell ,Estrach. 2009) .

## Conclusions :

Rheumatoid arthritis is the autoimmune diseases, occurs, when the body fail to differentiate between the itself and non-self-tissue, immune system which causes attack to own body tissue, and the most important signs and symptoms are Joint pain, swelling, fatigue, warmth around a

### *Disclaimer*

The article has not been previously presented or published, and is not part of a thesis project.

### *Conflict of Interest*

There are no financial, personal, or professional conflicts of interest to declare.

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## Synovectomy :

Remove the lining, or synovium, of a joint so it doesn't damage your cartilage and bone.

### Joint replacement :

Patients may elect to have joint replacements for large joints such as shoulders, hips, or knees as well as smaller joints in the fingers and toes, joint replacement surgery involves removing either all or part of a damaged joint and inserting a synthetic replacement. (Yoshihara et al. 2016)

joint, Patients with rheumatoid disease should know that today, thanks to rapid scientific progress, we have become more in control of this disease as in other diseases of rheumatism, provided that the diagnosis is early and that the patient complies with all instructions and advice directed by the doctor in this field, God willing, it will be much better than today.



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