



# Laboratory Communiqué

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**The *Laboratory Communiqué* is a quarterly publication released by Billings Clinic Laboratory Services as an informational tool for medical staff and laboratorians.**

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## Welcome to Sheilah Frazier

Sheilah started working for Deaconess Hospital Laboratory in 1980. She was the first medical technologist hired specifically for the new “3-11” shift which had previously been covered by a rotation of dayshift staff. Sheilah was the PM supervisor for approximately 8 years and during that time she was part of the team that implemented the lab’s first computer system.

Sheilah moved to dayshift and spent the next 8 years working in the Hematology and Blood Bank departments. After a brief 6 month return to the 3-11shift, she moved to the LIS (Laboratory Information System) department. In 2001, she was part of the team that built and implemented the Cerner Information System for the laboratory. In 2010, Sheilah became the LIS supervisor, a position she held until her recent acceptance of laboratory manager. Sheilah is currently transitioning to her new role where her focus will continue to be on developing quality relationships, a quality product and quality outcomes.

Sheilah states: I have spent all but the first year following graduation at the Billings Clinic Hospital. It is home to me. I strive to make every interaction a positive interaction and my goal is to be able to look back at yesterday, last week, even last year and feel that I have made a positive contribution in the work place. Billings Clinic Laboratory has some exciting things on the horizon and I am excited to be a part of its continued growth and excellence in providing quality laboratory testing and delivering those results in the best way to facilitate quality patient care.

## Sed Rates and CRP, Do they give us the same Information

Lately, our volume of ESR (erythrocyte sedimentation rate) testing has dramatically increased. We expected this test volume to slowly decrease as the CRP (C-reactive protein) and hs-CRP (high sensitivity C-reactive protein) tests became better utilized. Since that has not happened, it warrants a review of both tests and what information each can give us.

In general, both ESR and CRP measure the increase in inflammatory proteins. A test for CRP is a direct measurement of one of the major plasma proteins. An ESR is an indirect measurement of many proteins associated with inflammation. Neither of these tests is specific for a certain disease and, they are not necessarily elevated in all inflammatory conditions. For example, in rheumatoid arthritis there have been cases where both the ESR and the CRP are normal, particularly during the earliest stage of the disease. In

**ESR-Westergren**

**BC 1111**  
**MayoAccess BCL234**  
**CPT Code 85651**

**Reference Ranges:**

**Male**  
 <25 0-10 mm/hr  
 26-35 0-15 mm/hr  
 36-45 0-20 mm/hr  
 46-55 0-25 mm/hr  
 >55 0-30 mm/hr

**Female**  
 <15 0-10 mm/hr  
 15-25 0-15 mm/hr  
 26-35 0-20 mm/hr  
 36-45 0-25 mm/hr  
 >55 0-35 mm/hr

**ESR-Wintrobe**

**BC 1137**  
**CPT Code 8565**

**Reference Ranges:**

**Males 0-15 mm/hr**  
**Females 0-20 mm/hr**  
**Children 0-10 mm/hr**

these patients, the reason for this appears to be an insensitivity or low level of a triggering mechanism that normally stimulates the liver to produce the inflammatory proteins necessary for ESR and CRP testing. There are subtle differences in the behavior of these tests, depending on the suspected disease.

**ESR**

The ESR is the rate at which erythrocytes settle in a vertical column of anticoagulated blood in 60 minutes. At the end of 1 hour, the distance from the bottom of the surface meniscus to the top to the erythrocyte sediment is reported as the sed rate result in mm/hr. It is one of the oldest laboratory tests still in wide use, despite being non-specific. It is simple and inexpensive.

As a non-specific test the ESR has inherent limitations in its clinical utility; however, in some clinical contexts the ESR may provide valuable information for screening, diagnosis, and monitoring disease activity or therapeutic response in:

- Temporal Arteritis and Giant cell arteritis
- Polymyalgia Rheumatica
- Polymyositis
- Rheumatoid arthritis
- Psoriatic arthritis
- Ankylosing Spondylitis
- Lupus
- Neoplastic Diseases
- Emergency department setting in the evaluation of suspected pneumonia, appendicitis, abscesses, pelvic inflammatory disease, septic arthritis, Lyme disease and other acute inflammatory diseases

Technical factors also influence the ESR. RBCs settle more quickly in non-vertical tubes and with vibration so strict adherence to procedure must be followed. There are other conditions that can influence or cause an ESR to be elevated such as pregnancy, diabetes mellitus, hypothyroidism, anemia and the use of certain medications and supplements such as heparin and vitamin A. On the other hand, a decreased ESR could be caused by a clotted blood sample, sickle cells, hemolytic anemia, polycythemia or medications such as cortisone and salicylates. Temperature fluctuations and aging of the specimen can also affect the result. The analysis must be completed within 4 hours or the specimen should be refrigerated and analyzed within 24 hours. If refrigerated, the specimen must be brought to room temperature prior to testing.

The test can be performed by a several methods but in our laboratory we offer the two standard methods, Westergren and Wintrobe.

**Westergren**

- EDTA –anticoagulated blood is diluted 4:1 in a prefilled vial (0.2mL of 3.8% sodium citrate is used as diluent).
- The tube is a 200 mm column
- Highly elevated ESRs can be detected due to the tall column height
- This method is recommended by the International Council for Standardization in Hematology.
- Reference Ranges vary by sex and ages

**C-Reactive Protein****BC 8815****MayoAccess BCL228****CPT Code 86140****Reference Range:****<0.9 mg/dL****High sensitivity (hs)****C-Reactive Protein****BC 4649****MayoAccess BCL408****CPT Code 86141****Reference Range:****0.0-0.5 mg/dL****Wintrobe**

- EDTA-anticoagulated blood is used undiluted.
- The tube is a 100 mm column and is significantly shorter than the Westergren column.
- This method is considered to have increased sensitivity for detecting mildly elevated ESRs.
- Marked elevations are hard to detect due to the short column height
- The Reference Range is lower than for the Westergren method

There are alternate ESR methods available commercially. The primary aim with these is to shorten the test time and/or reduce the specimen volume. By doing either of these the test may have additional consequences. We will continue to review these alternate methods and possibly make a change in the future.

**CRP**

C-Reactive protein is one of the most sensitive acute-phase reactants for inflammation. CRP is synthesized by cells in the liver and released into the circulatory system in response to proinflammatory stimuli, the strongest of which is interleukin-6 (IL-6). CRP has been called the archetype of acute phase proteins due to its rapid (24-28 hours) and marked response to a wide variety of inflammatory conditions and diseases. CRP levels can increase dramatically (100-fold or more) after severe trauma, bacterial infection, inflammation, surgery or neoplastic proliferation. Its concentration falls rapidly when the condition resolves, due to short half-life (19 hours). Other conditions that can cause an elevation in CRP are:

- Tuberculosis
- Inflammatory diseases such as rheumatoid arthritis, rheumatic fever, lupus, connective tissue disease and vasculitis
- Post surgical infections
- Transplant rejection
- Heart attack damage
- Inflammatory bowel disease
- Pelvic inflammatory disease

As with the ESR, elevated CRP levels can occur with pregnancy and oral contraceptive use. Medications such as statins; nonsteroidal anti-inflammatory drugs (NSAIDs), including ibuprofen and acetaminophen can also affect the level of CRP.

**hs-CRP**

CRP has been around for quite awhile but the traditional assay lacked the sensitivity to measure basal levels of CRP. A more sensitive method was introduced in the mid-1990s and this method is referred to as high sensitivity CRP. This assay is being increasingly used as a marker for cardiac risk assessment and as a prognostic tool in heart disease and stroke. High sensitivity-CRP can accurately measure basal levels of CRP throughout the currently accepted cardiovascular risk assessment range (0.20-10.0 mg/L).

The American Heart Association (AHA) and Centers for Disease Control and Prevention (CDC) developed a scientific statement that recommends hs-CRP as a more sensitive assay for the prediction of vascular disease, compared to the traditional assay for CRP but it is not a substitute for the traditional



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cardiovascular risk markers.

In our laboratory we offer both the CRP and the hs-CRP.

CRP and hs-CRP

- An acute phase protein produced by the cells in the liver.
- Both assays are performed on heparinized plasma
- A quantitative immunoturbidmetric assay
- CRP assay used as an aid in the diagnosis of inflammation and infection
- hs-CRP assay used for cardiac risk assessment

## Test Updates

### 25OH Vitamin D

Effective May 7, 2012 the specimen requirement for this test was changed from heparinized plasma (green gel top) to serum (red gel top).

This change was due to the recent modification of the Liaison Vitamin D assay. The reformatted method is now unaffected by heterophilic antibodies which appeared to cause some interference problems with the previous method.

### Thrombin Time

Effective June 11, 2012, the reference range for Thrombin was changed. The old range was 15.8 – 21.8 seconds. The new reference range is now 16.4 – 22.3 seconds. This was necessitated by a new lot number of reagent.

## Education

The 5<sup>th</sup> Annual Laboratory Services Fall Education Conference is scheduled for Friday, November 2<sup>nd</sup> in the MAFHCC on the main campus of Billings Clinic. More information on the speakers and the agenda will be released in the October Communiqué.

For more information about Billings Clinic Laboratory please call (406) 657-4060.  
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