Microbiology Updates*
Arthur E. Crist, Jr., Ph.D., Clinical Microbiologist

New Respiratory Virus Testing Panel - The laboratory has recently moved to a new testing platform for the respiratory virus panel. The assay being used is marketed by Biofire, Inc. and is based on microarray technology. It takes minutes to setup and an hour to run the assay. The assay detects 17 viral targets which include coronavirus HKU1, coronavirus NL63, coronavirus 229E, coronavirus OC43, human metapneumovirus, human rhinovirus/enterovirus, influenza A, influenza A/H1, influenza A/H3, influenza A/H1-2009, influenza B, parainfluenza 1,2, 3, and 4, and respiratory syncytial virus (RSV). Specimen collection and transport is the same, a nasopharyngeal flocked swab submitted in Universal Viral Transport Medium (UTM). Specimens not received in the laboratory within 4 hours should be kept refrigerated at 2-8°C.
Order: Respiratory Viral Detection Panel  Alternate Name(s): RESP PCR

Pre-OP screening for methicillin-resistant (MRSA) and methicillin-susceptible (MSSA) Staphylococcus aureus. The laboratory will be moving from a culture based to a molecular based assay for Pre-OP screening for MRSA/MSSA effective January 7, 2013. The new assay is marketed by Cepheid, Inc. and is a real-time PCR assay with analysis performed on the Cepheid Infinity Instrument. The culture based assay takes 24-72 hours to obtain a final result compared to 1.5 hours for the real-time PCR assay. Specimen collection and transport is the same, a nasal swab submitted in a BBL CultureSwab Transport Tube (Red Cap).
Order: MSSA MRSA PCR Screen for Pre-OP  Alternate Name(s): MRSA MSSA PCR Screen for Pre-OP; MSSA PCR; Pre-OP MSSA MRSA PCR Screen

* Additional information and pictures of the collection devices can be found at www.wellspanlabs.org
Mean Platelet Volume (MPV)
Diane Gaspari, SH (ASCP), Division Manager, Core Lab

The Mean Platelet Volume (MPV) is a parameter reported with Complete Blood Counts (CBC). The MPV reference range is 9.0-12.6fL. The MPV is a diagnostic measure of the average platelet size in a blood sample and can be used to obtain information about platelet production in the bone marrow. Platelet size is determined at the time of platelet production from megakaryocytes. There is evidence that MPV is increased when both platelet production and destruction are increased, probably mediated by cytokines such as interleukin-3, interleukin-6, and thrombopoietin. There is also evidence that larger platelets are functionally more reactive, produce more thromboxane A2, aggregate more readily in vitro, contain more dense granules, and show increased expression of membrane receptors.

Abnormally low MPV values correlate primarily with thrombocytopenia when it is due to impaired production such as in aplastic anemia or leukemia. MPV is increased when there are large or “giant” platelets and there is increased peripheral destruction of platelets, such as immune thrombocytopenic purpura (ITP), in myeloproliferative disorders, and Bernard-Soulier syndrome.

In addition to identifying the causes of thrombocytopenia, clinical applications of the MPV include:

- Effective marker of thrombotic risk¹-⁵
- Accurate prognosticator in myelodysplasia (MDS)⁷
- Predict the likelihood of bone marrow metastasis in cancer patients⁶
- Improved detection of platelet morphologic abnormalities within the laboratory

As a marker of thrombotic risk, several studies have shown that patients with higher MPV results are at increased risk for a thromboembolic event. The most likely reason for this is that immature platelets (typically larger in size) are more reactive than older platelets. This has been demonstrated in several clinical scenarios:

- In one study with more than 25,000 patients and 12 years of follow-up, patients with higher MPV had a higher incidence of venous thromboembolism. There was a 1:5 fold increase in risk when the thromboembolism was unprovoked (e.g., absence of risk factors such as smoking, cancer, prothrombin mutations) and a 1:3 fold increase in risk when provoked.¹
- Higher MPVs were observed in patients undergoing acute myocardial infarction. In addition, when a myocardial infarction occurred, the risk of death was higher in patients with a higher MPV.²-⁵
- Among myocardial infarction patients who underwent coronary angioplasty, those with higher MPV had a higher risk of restenosis.²
- As a marker of prognosis in MDS, the MPV can be used alone or in combination with the platelet count. MDS leads to thrombocytopenia and in cases when the bone marrow is not yet severely affected and is still able to respond to increased levels of thrombopoietin, there will be an increased number of immature platelets and a higher MPV. Conversely, if the MPV is low and thrombocytopenia is present, this indicates an advanced to aggressive case of MDS, where the bone marrow is unable to respond to the thrombopoietic stimulus.⁷
- Increased MPV values have also been reported in patients with vascular risk factors such as diabetes mellitus (especially when associated with microvascular complications), hypercholesterolemia, and smoking.

In summary, together with other clinical and laboratory parameters, the MPV may contribute useful information in individual patients regarding cardiovascular and cerebrovascular risk, help in the evaluation of unexplained thrombocytopenia, and predict prognosis in hematologic neoplasia.

If there are any questions concerning the MPV, please contact Diane Gaspari, SH (ASCP), Core Lab Manager at 851-2578 or ggaspari@wellspan.org.

References:

**Chronically Transfused Patients with Multiple Antibodies**

Steve LaCour, MLS (ASCP)

“What do you mean it may take 24-48 hours to have blood available for my patient?” You may find yourself asking this question when caring for a chronically transfused patient. Oncology patients and sickle cell disease patients are two categories of patients who are often chronically transfused with red blood cells.

Oncology patients are transfused to correct low blood counts due to chemotherapy treatment. Like any other foreign object our bodies are exposed to, blood transfusions from random donors containing RBC antigens that the recipient lacks can stimulate antibody production in the recipient to those antigens they lack. As patients are exposed to foreign antigens through chronic transfusion, the likelihood they will develop one or more antibodies increases. Antibody production is different for each patient and their immune systems all respond differently to red blood cell transfusion. There are some patients who are chronically transfused and develop no antibodies, and there are patients who are transfused with a single unit and develop multiple antibodies. There are even some patients who have five or more antibodies.

Sickle cell disease patients are another group of patients who are often chronically transfused. Transfusion is indicated to help increase hemoglobin levels lost due to hemolysis and poor survival of RBCs. When a new sickle patient is identified as needing a transfusion, the Transfusion Services takes preventative measures to help reduce antibody production. The patient is initially tested for three RBC antigens (C, E and K) and provide antigen negative blood if it applies. These three antigens are often the most common cause for antibody production in patients who develop multiple antibodies. If a sickle cell patient develops an antibody, there are other steps that are taken to prevent against future antibody formation.

To help prevent against additional antibody production in chronically transfused patients who have already formed an antibody, there are tools that are used to help provide what is known as Phenotypically Matched RBCs. To start the process the patient’s blood is sent to the American Red Cross (ARC) for molecular phenotyping. When the patient’s blood is molecularly phenotyped, the ARC will identify which RBC antigens are present. Once the results are obtained (may take several weeks for the testing to be completed), the patient’s Blood Bank record will be updated to indicate which antibodies the patient has or does not have. For future transfusions, blood will be provided that prevents exposing the patient to antigens foreign to their blood type. Some examples of the many red blood cell antigens include: C, c, E, e, K, Fya, Fyb, Jka, Jkb, M,
N, S, s. Frequently, the patient’s combination of antigens and antibodies means they will be compatible with only 1 or 2 percent of the blood donor population.

Compatible units in the York Hospital Blood Bank are utilized first when available; however, blood is often ordered from the ARC for patients with multiple antibodies. When a patient tests positive on their antibody screen, the following message will be placed in the chart:

“This patient’s blood contains unexpected antibodies. Antibody identification may take longer than 12 hours to complete. If transfusion is planned, please place a product order for red blood cells 48 hours in advance, if possible. After fulfilling the product order for red blood cells, additional compatible red blood cells CANNOT be available in an emergency. Please direct questions regarding York Hospital patients to their Blood Bank at 851-2510, or direct questions regarding Gettysburg Hospital patients to their Blood Bank at 339-2317.”

The ARC and the York Hospital Blood Bank will do their best to provide the specially requested blood in a timely manner. Sometimes blood can be found, delivered and processed in less than 8 hours, but usually it may take up to 24-48 hours for blood to be ready from start to finish.

If you would like more information about blood transfusion in chronically transfused patients, or if you have questions about blood availability for a patient contact the York Hospital Transfusion Services Department at 851-2510.

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**Calling Microbiology Results**

Arthur E. Crist, Jr., Ph.D., Clinical Microbiologist

The protocol for phoning Microbiology laboratory results is being revised in order to be consistent with the Laboratory Services Administrative, **Call Laboratory Results**, Policy Number A-SP-6, Version 13, April 5, 2010. This policy has been reviewed by Department Chairs and the Medical Executive Committee and will go into effect on February 11, 2013.

The Microbiology Laboratory will call results when requested or when it is medically indicated to notify the physician or other health care provider in an expeditious manner. The laboratory can expedite results to any queued printer set up to receive reports from the Laboratory Information System (Cerner).

A. The following are test results which will be automatically phoned to the physician or other healthcare provider:

1. Critical Values
   a. Positive Blood Cultures
   b. Positive CSF which includes Gram’s stain, culture, PCR, and Cryptococcal antigen results.
   c. Positive results (Gram’s stain or culture) on normally sterile body fluids, e.g. pericardial, synovial, pleural, amniotic, eye fluids, etc. and on tissues obtained in the OR from internal organs, e.g. lung, liver, kidney, etc.

2. Priority One (P1) Tests

3. *Mycobacterium tuberculosis*

4. Any unusual or highly contagious pathogenic microorganism, e.g. agents of bioterrorism, hemorrhagic fever viruses, arboviruses, etc.
B. Call Result Requests for outpatients
   (1) A CALL procedure is ordered which designates that the test is not a priority request but the ordering clinician would like the results to be called to the office when tests are completed. A result of “Done” is automatically entered for all CALL requests.

C. Call responsibility
   (1) Inpatients: It is the responsibility of the technologist in the technical area to make the call and properly document the call in the computer.
   (2) Outpatients: Priority results will populate the call queue in the lab office with verification of the result in the computer. It is the responsibility of the office staff to call the ordering clinician’s office with the results and enter the documentation of the call in the computer.