

TURNAROUND TIMES

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March 2006

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Red Blood Cell Usage

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On July 1, 2006, Community Blood Center (CBC) will provide ONLY prestorage Leukocyte Reduced Red Blood Cells (LR-RBC). Non LR-RBC will no longer be available, even on special request. CBC cannot continue to juggle two inventories due financial and regulatory restraints. Currently, 40% of our allogeneic blood transfusions are LR-RBCs and 60% are non LR-RBC. Several Kansas City hospitals have been 100% LR for years. Prestorage Leukocyte Reduction removes > 99.99% of white blood cells and has several benefits:

1. Cytomegalovirus (CMV) transmission is decreased to levels comparable to CMV seronegative blood (CMV resides in leukocytes). As a result CMV seronegative blood will not be available.
2. Febrile reactions do not occur nearly as frequently because WBC degradation does not occur in the unit of stored blood. Preventing WBC degradation decreases free cytokines IL-1, IL-6, IL-8, and Tumor Necrosis Factor which cause febrile reactions.
3. HLA alloimmunization (platelet refractoriness) is reduced, which is particularly troublesome in heavily transfused cancer patients.
4. Leukocyte Reduction has been shown to decrease post-operative infections and hospital length-of-stay (LOS). We hope the savings generated by the decreased infections and LOS will help pay for the additional \$100,000 annually the LR-RBC will cost the hospital.

Red Cell use decreased in fiscal 2005 to 12,000 units a year, but is slowly increasing back to 13,000 units a year at the current run rate in FY 06. As has been discussed many times, fear of viral infections (HIV and HCV) is a problem of the past thanks to Nucleic Acid Testing and thorough health histories for donors. Significant risks of transfusion still exist, however. These include:

1. Transfusion of the wrong unit of blood to the wrong patient (1:10,000)
2. Transfusion Related Acute Lung Injury (TRALI) (1:7500)
3. Febrile reactions (1% in Non LR-RBCs, essentially 0% in LR-RBCs)
4. Allergic reactions (2%)
5. Fluid Overload (20%)

Thus, it is important to use blood judiciously to maintain patient safety and provide optimum care. Only one good randomized control study in the last 100 years has been done to determine when blood should be transfused.¹ The Transfusion Medicine specialists and the Blood Utilization Committee agree that a safe transfusion trigger for non

surgical patients is a hemoglobin of 7 g/dL. Unfortunately, we have not been able to monitor pretransfusion hemoglobin levels in order to evaluate appropriateness of transfusion. We are working on a computerized report that will flag transfusions done for non surgical patients with higher hemoglobins. It should be in place sometime this spring. We will evaluate the number of transfusions that don't meet our criteria and do chart reviews for appropriateness. The results will be reported on our website (without names, of course) for staff to review.

For the safety of your patients, we ask that you please be mindful of when you (and your residents) transfuse.

References

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Laboratory Evaluation of Hypercoagulability in Venous Thromboembolism

Mark T. Cunningham, MD

Deep venous thrombosis and pulmonary embolism, two forms of venous thromboembolism (VTE), are common and potentially fatal clinical problems. A variety of inherited and acquired biochemical abnormalities, known collectively as thrombophilias, predispose individuals to the development of VTE. At least one third of patients with idiopathic VTE have thrombophilia on laboratory testing.

The College of American Pathologists and others have established practice guidelines for laboratory evaluation of thrombophilia in patients with VTE.^{1,2} The intent of laboratory testing is to identify etiologic risk factors, identify reversible risk factors (e.g. hyperhomocysteinemia), and determine the duration of anticoagulant therapy.

The recommended laboratory tests for thrombophilia include the following: activated protein C resistance, prothrombin G20210A mutation, functional protein C, functional protein S, functional antithrombin, anticardiolipin antibodies (IgM, IgG), lupus anticoagulant, and plasma homocysteine.

At KUMC, the activated protein C resistance test is the screening test for the factor V Leiden mutation. If positive, then factor V Leiden mutation analysis is performed as a reflex test.

The International Society of Thrombosis and Haemostasis recommends that at least two tests be performed to adequately exclude lupus anticoagulant.³ At KUMC we recommend the dilute Russell Viper venom time (DRVVT) and the hexagonal phase phospholipid neutralization test.

The DRVVT and hexagonal test examine for lupus anticoagulants that inhibit the common pathway and intrinsic pathway, respectively, of the coagulation cascade.

The clinical indications for testing depend on whether the patient has had a first episode VTE, has had two or more episodes of VTE, or is asymptomatic with no history of VTE. The indications with a first episode VTE are as follows: age <50 years, family history of VTE, unusual anatomical site (cerebral, mesenteric, portal, hepatic), unprovoked VTE, or VTE associated with pregnancy, oral contraceptives, or hormone replacement therapy. All patients with two or more episodes of VTE should be tested. Finally, asymptomatic females with a family history of thrombophilia in a first degree relative should be tested if they are contemplating pregnancy or oral contraceptive use.

References

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2. Bates SM, Ginsberg JS. Treatment of deep-vein thrombosis. *N Engl J Med* 2004; 351: 268-277.
3. Brandt J, Triplett DA, Alving B, Scharrer I. Criteria for the diagnosis of lupus anticoagulants: an update. On behalf of the Subcommittee on Lupus Anticoagulant/Antiphospholipid Antibody of the Scientific and Standardization Committee of the ISTH. *Thromb Haemost* 1995; 74: 1185-1190.

Laboratory Specimen Collection for Tuberculosis

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M. tuberculosis can infect any organ of the body however; the majority (85%) of tuberculosis (TB) is pulmonary. Thus, when TB is suspected sputum is the optimal specimen.

Smear and culture examination of at least 3 sputum specimens collected on 2 different days is the new CDC recommendation for the laboratory diagnosis of TB¹. If extra-pulmonary disease is suspected, sputum should be collected in addition to extra-pulmonary specimens.

A good sputum specimen consists of material expectorated from the bronchial tree. The best sputum is obtained early in the morning before the patient has eaten. Collecting good sputum requires clear instructions to the patient.

When a patient produces sputum, tubercle bacilli can be aerosolized thus the specimen should be collected away from other people.

Some patients shed TB irregularly and in small numbers. In these patients more specimens on different days will increase the chance of a positive culture. Nebulized sputum or bronchoscopy is used to obtain specimens in individuals who cannot produce sputum. Specimens should be transported to the laboratory as soon as possible after collection. If a delay is unavoidable the specimens should be refrigerated to inhibit the growth of unwanted bacteria.

When a patient has a positive AFB smear, only 2 additional

specimens will be examined and cultured. After that, one specimen per week will be processed unless the laboratory is consulted.

Because *M. tuberculosis* can infect any organ in the body, extra-pulmonary specimens, (body fluids, tissues, and urine) can be submitted for culture. Aseptically collected specimens are to be collected in a sterile container without fixatives or preservatives. Specimens known to contain contaminating normal flora require processing before culture. Urine is the most common extra-pulmonary specimen that contains normal flora. To minimize contamination of urine the external genitalia should be washed before the specimens are collected and the urine should be immediately processed or refrigerated within 2 hours.

Laboratory Examination

Direct smear examination. Concentrated AFB smears are done Mon-Fri. STAT AFB smears are available on unconcentrated sputum on the weekends. Positive results are presumptive for the diagnosis of TB because acid fast bacilli (AFB) may be mycobacteria other than *M. tuberculosis*. A genetic amplification probe for *M. tuberculosis* complex is done the next day to confirm TB on positive respiratory smear. A negative AFB smear does not rule out TB.

A direct DNA amplification test is available at KUMC laboratory. This test is FDA licensed for use on smear-positive and -negative respiratory specimens from untreated patients. Results can be obtained within 24 hours on weekdays. Sensitivity for smear positive specimens is >95% and ~50% for smear negative specimens. Specificity for both is 98%. DNA amplification cannot distinguish between dead and live organisms thus it is not used for testing patients for cure after therapy.

AFB Cultures are available for all specimens, regardless of AFB smear results. Solid media and liquid media are used and cultures are kept for 6 weeks until terminated as negative. At times AFB cultures are terminated due to overgrowth of more rapidly growing bacteria.

Identification of AFB organisms uses either nucleic acid probes or biochemical tests. A report of "*M. tuberculosis complex*" indicates the presence of one of three organisms *M.tuberculosis*, *M.bovis* and *M.africanum*. Over 98% of these organisms are ultimately identified as *M. tuberculosis*; it should be assumed that a *M.tuberculosis* complex result means *M. tuberculosis*.

Drug susceptibility testing is done on all initial *M. tuberculosis* isolates. The Kansas State laboratory tests the isolate for drug susceptibility.

References

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