Saving Blood

The laboratory has worked with Nursing and the Blood Conservation Team to reduce the amount of blood drawn from patients for laboratory tests. One particularly effective initiative has been the storage of inpatient and outpatient blood specimens for 2 weeks. This Specimen in Lab (SIL) policy allows additional laboratory tests to be run on a previously drawn specimen instead of having to redraw the patient. Recently, the outcomes of this SIL policy were measured. During 2003 the laboratory received 11,244 requests to perform tests on specimens in lab. This resulted in a monetary savings of $51,726 for medical supplies and labor costs. However, the most important outcome was elimination >11,000 unnecessary phlebotomies, resulting in the conservation of at least 71,428 mL of blood. This volume is equivalent to 140 units of Red Blood Cells. The SIL policy has definitely played a significant role in our Blood Conservation Program.

Efficient, Effective Enterovirus Evaluation

Enterovirus is a leading cause of aseptic meningitis in adults and children that occurs seasonally in the Midwest United States, generally in summer and fall. Enterovirus testing by PCR has been performed in-house by Saint Luke’s Regional Laboratories since January 2004.

A recent survey of aseptic meningitis cases admitted to Saint Luke’s Hospital over the last three years showed an average length of stay of 2.8 days with average hospital charges of $14,050. Typically, patients are admitted to await results of bacterial cerebrospinal fluid (CSF) cultures and viral CSF PCR studies, as well as receiving IV antibiotics. A pilot study was begun with the Saint Luke’s Hospital Emergency Department (ED) on July 1 to evaluate the effectiveness of performing CSF Enterovirus PCR on a STAT basis. Results will be provided within 3-4 hours, so that patients with a typical aseptic meningitis presentation based on clinical findings and other CSF results, and a positive Enterovirus PCR can potentially be discharged from the ED. The pilot study will continue through the end of October. If a significant impact is demonstrated, plans will be made to provide STAT Enterovirus testing for all Emergency Departments in Saint Luke’s Health System.

T cells and Psoriasis

Psoriasis is a chronic inflammatory, hyperproliferative skin disease. Recent studies have demonstrated that T cells play a major role in the pathogenesis of psoriasis. Psoriatic plaques contain an abundance of activated memory helper (CD4+) and suppressor (CD8+) T cells that secrete proinflammatory cytokines and promote keratinocyte proliferation.

In January 2003, the FDA approved the use of Alefacept (Amevive, Biogen) for treatment of chronic plaque psoriasis. Alefacept is a fusion protein consisting of a portion of leukocyte function-associated antigen (LFA-3) and the hinge region of IgG subclass 1. This fusion protein selectively binds to the CD2 antigen on T cells and blocks their interaction with LFA-3 on antigen presenting cells (APC), preventing T cell activation and proliferation. Alefacept also induces selective apoptosis of CD4 memory T cells by binding to the Fc receptor on natural killer cells (NKC).
Alefacept is usually administered IM or IV weekly for 12 weeks. Consistent with its mechanism of action, circulating total lymphocyte counts and CD4+ and CD8+ T cell subsets are significantly reduced. The nadir is usually reached between 6 and 8 weeks after initiation of therapy. Clinical improvement is directly correlated with T cell reduction. Those patients who experience at least a 75% reduction in circulating T cells have more than a 50% reduction in the Psoriasis Area Severity Index. CD4+ and CD8+ T cells counts return to normal in the majority of patients 12 weeks after the completion of therapy. However, the clinical response has a much longer duration, because a prolonged period of time is required for the immune system to restore memory T cell function.

CD4+ T cell should be measured prior to initiating therapy and weekly during the 12-week dosing period. Dosing should be withheld if the CD4+ count falls below 250 cells/µL. Treatment should be discontinued if the CD4+ count remains below 250 cells/µL for one month, because patients are at increased risk of developing opportunistic infections or malignancies.

Is Anyone Folate Deficient Anymore?

The FDA mandated folic acid fortification of cereals and grains in 1996 to decrease the risk of neural tube defects in pregnancy. Individuals following the food guide pyramid could increase their daily folic acid intake as much as 400 µg.

Saint Luke’s Regional Laboratories has periodically reviewed serum folate test results to determine whether concentrations have changed since food fortification began. Most recently, the results of 1000 consecutive folate levels tested between March and June 2004 were analyzed.

<table>
<thead>
<tr>
<th>Year</th>
<th>% Folate Deficient</th>
<th>% Folate &gt;20 ng/mL</th>
<th>Median (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>12.5%</td>
<td>3.6%</td>
<td>5.7</td>
</tr>
<tr>
<td>1999</td>
<td>0.7%</td>
<td>9.0%</td>
<td>11.4</td>
</tr>
<tr>
<td>2004</td>
<td>0.6%</td>
<td>20%</td>
<td>13.7</td>
</tr>
</tbody>
</table>

The percentage of samples with low serum folate concentrations has decreased dramatically following food fortification and has remained <1% for the past 5 years. The number of samples with above normal (>20 ng/mL) folate concentrations has increased fivefold during the past 8 years. The median serum folate concentration has increased almost threefold during this time interval.

The low prevalence of folate deficiency calls into question the common practice of simultaneously ordering folate and vitamin B12 assays. Folate deficiency, in the absence of megaloblastic anemia, is now rare in the United States. Even in patients with megaloblastic anemia, there are often clinical indications that would lead to ordering only one of the two tests. For example, a vegetarian is much more likely to have B12 deficiency, while a patient with poor nutrition is more likely to have folate deficiency. Vitamin B12 levels are often ordered during the workup of peripheral neuropathies, but folate levels are not indicated. Routinely ordering both tests not only doubles the laboratory’s work, but also increases health care costs.

Angiotensin Converting Enzyme

Angiotensin converting enzyme (ACE) participates in the renin cascade in response to hypovolemia, by converting angiotensinogen I to angiotensinogen II. The endothelium of the lung is the primary source of ACE. Because of this location, ACE production is increased in sarcoidosis. Serum ACE concentration is elevated in 79% of patients with active sarcoidosis. ACE activity reflects disease activity. Levels are higher in stage III than in stage I disease. Enzyme activity decreases dramatically in some patients after prednisone therapy.

Other diseases such as Gaucher’s disease, leprosy, histoplasmosis, amyloidosis, untreated hyperthyroidism, psoriasis and chronic renal disease have also been associated with increased ACE levels. Serum ACE is significantly decreased in patients taking ACE inhibitors. Corticosteroids may slightly decrease ACE values.

F.V. Plapp, M.D., PhD, M.L. Zucker, M.D. C.E. Essmyer, M.D.