Doing tests twice for two docs

**Q** If you receive requests from two different doctors for the same lab test to be done at the same time, is it legal to draw two samples and perform the test twice?

**A** I will use the word “compliant” instead of “legal.” My concern would be in the case where Medicare covered the patient and the tests did not meet medical-necessity checks. If there is medical rationale for a test to be performed multiple times in a short period, then it is possible this would be acceptable, even though it appears to be duplicate testing. If there is not medical necessity, then it could be perceived as potential abuse (and unnecessary utilization of the laboratory’s resources). Other insurance carriers most likely have criteria and payment limitations for repeat testing and procedures. If not already in place, you might consider creating a policy that addresses how to respond to this type of request and consult with your legal-compliance or risk-management departments. Our approach is to draw one sample, perform the test once, and attach the names of both physicians to the order in our lab-information system.

— Juanita Petersen, MT(ASCP), MBA
Laboratory Manager
Oregon Health and Science University
Portland, OR

Matrix effect for controls?

**Q** Do all control materials have a matrix effect, even if derived from fresh-frozen human plasma? How do I know if a control is a commutable reference material?

**A** A matrix effect is defined as the influence of a property of the sample, independent of the presence of the analyte, on the measurement and thereby on the value of the measurable quantity. The sample matrix includes all the components of a material system, except the analyte itself. Two types of matrix effects may be observed: chemical and physical. Chemical matrix effects are those due to interferences from the analytical method. Physical matrix effects are due to differences in physical properties, such as differences in viscosity or surface tension between a control material, calibrator, or standard solution and patient samples. Non-native forms of the analyte, such as enzymes of non-human origin, can produce a different measurement signal than expected for native (i.e., human) forms of the enzyme. Ideally, control material should be similar in composition to the patient samples being analyzed, thus minimizing matrix effects.

**Whether or not control materials will show a matrix effect is dependent upon the analytical method used.**

The compositions of samples measured in clinical laboratories include those from a variety of patient populations: male, female, those with varying states of health, and patients on a wide variety of drugs and diets. Control materials are typically animal (i.e., bovine) based, and often supplemented with enzymes and other protein constituents, electrolytes, metabolic intermediates, and drugs. As a result, control materials typically do not mimic patient samples.

The commutability of a reference material refers to the mathematical relationship between the values obtained for these samples and the corresponding control material using different analytical methods. The commutability of a reference material is considered to be a measurement of matrix effect. This is determined by measuring analyte X in patient serum and the corresponding control material using two different analytical methods. A commutable control will change to the same degree as the patient serum using the different methods. If the control is commutable, one may assume that there is no matrix effect for the given methods used. Non-commutability is due to either matrix effects or non-native forms of the analytes. Examples of the latter include, but are not limited to, enzymes of non-human origin and human proteins modified during isolation.

Whether or not control materials will show a matrix effect is dependent upon the analytical method used. Testing control material by different analytical methods of measurement may reveal non-commutability due to a possible matrix effect.

— Jennifer Dunlap, MD
Department of Pathology
Oregon Health and Science University
Portland, OR

Hb and HCT do not match in oncology patients

**Q** Our laboratory has a large oncology population. We have noticed recently that some patients have hemoglobin/hematocrit results that do not match and require spun hematocrit for report. Can you advise how to report these specimens or direct me to literature addressing this problem? We know one patient is a known polycythemic, but the others are being treated with a new red-cell-boosting drug.

**A** Nearly all current procedures for measuring hemoglobin involve red-blood-cell (RBC) lysis/dilution and formation of a cyanmethemoglobin compound, which is read by a spectrophotometer at 540 nm. Hematocrit values may be

**References**


Tips from the clinical experts

determined manually or by an automated method. Automated hematocrit values are derived from a calculation in which the hematocrit equals the RBC count multiplied by mean corpuscular volume (MCV), then divided by 10. The hematology analyzer directly measures both the RBC count and MCV. Manual methods are determined by microhematocrit centrifugation and can be 2% to 3% higher than automated hematocrit due to plasma trapping. To ensure that the hemoglobin and hematocrit are accurate, a quick mathematical check referred to as the “rule of three” has been described. The hematocrit is multiplied by three, and this value should agree within +/-3% of the hemoglobin. This rule can only be applied, however, to normal erythrocytes and does not apply when the MCV, hemoglobin, or RBC count is abnormal.

The disagreement of “rule of three” could be seen in following situations using automated hematology analyzer:

- true abnormal erythrocytes, such as reticulocytes, microcytosis, hypochromic RBCs, erythrocytosis, and others;
- false elevations in hematocrit, hemoglobin, or RBC counts. These may be seen in patients with cryoproteins, lipemia, high white-blood-cell counts, and giant platelets; and
- instrument problem, random error may have occurred.

The function of erythropoietin is to stimulate erythropoiesis in the bone marrow by stimulating committed stem cells to proliferate and differentiate, decreasing erythroid precursor (normoblast) maturation time, increasing the rate of hemoglobin synthesis, and stimulating early release of bone marrow reticulocytes. It is likely that treatment with recombinant erythropoietin in oncology patient population is leading to reticulocytosis, which could cause increased hematocrit and, thus, mismatch in your hemoglobin and hematocrit values.

— Sarah Henry, MD
Guang Fan, MD PhD
Department of Pathology
Oregon Health and Science University
Portland, OR

MIC for *H influenzae*

Q We routinely test our *Haemophilus influenzae* isolated from sterile sources for beta-lactamase production. If the organism is beta-lactamase resistant, is the current recommendation to perform MIC susceptibility testing on the organism? A Current recommendations from the Clinical and Laboratory Standards Institute (CLSI) (2007) is to test ampicillin, one of the 3rd-generation cephalosporins, chloramphenicol, and meropenem for cerebrospinal fluid (CSF) isolates of *H influenzae*. The results of a direct beta-lactamase test can provide a rapid means of detecting ampicillin and amoxicillin resistance (beta-lactamase positive = resistant; beta-lactamase negative = susceptible). The majority of isolates of *H influenzae* that are resistant to ampicillin and amoxicillin produce a TEM-type beta-lactamase. Beta-lactamase negative, ampicillin-resistant (BLNAR) strains of *H influenzae* do occur but are very rare in the United States. CLSI does not have any recommendations for testing of *H influenzae* from sterile sources except for CSF. This testing can be performed by either disk diffusion or MIC broth dilution using *Haemophilus* test medium (HTM) agar or broth, respectively.

— Susan E. Sharp, PhD (DABMM)
Director of Microbiology,
Kaiser Permanente Pathology
Regional Laboratory;
Associate Professor,
Oregon Health and Science University
Portland, OR

References


72-hour crossmatch limit

Q My question regards drawing more blood for crossmatching extra units when the original sample has been depleted. If it is during the 72-hour period from the original sample draw, what is an acceptable labeling practice for the extra sample tube? Our current policy is to reband the patient and start a new 72-hour period. My understanding is that this is not necessary until the 72-hour limit from the original sample has expired. Our lab director says she does not want to lose the revenue generated from the extra type and screen. Is this an acceptable practice? What should we be doing?

Since red-cell units crossmatched prior to new sample cannot be used due to the new label from rebanding, our policy is not to reband the patient for the same episode as long as patient has not left the hospital.

A The disadvantage to this practice is that we need to repeat not only type and screen but also the crossmatch of the red-cell units. Since red-cell units crossmatched prior to new sample cannot be used due to the new label from rebanding, our policy is not to reband the patient for the same episode as long as patient has not left the hospital. If the sample is exhausted and a new sample is redrawn within 24 hours, then we only repeat ABO/Rh type of the sample to confirm ABO/Rh type, and this sample carries the same 72-hour crossmatch expiration limit. After 24 hours type as well as screen is repeated and a new 72-hour sample crossmatch expiration limit is given. The only exception to this policy is that identification remains the same during the period of hospitalization, and previously crossmatched units within 72-hour periods are not required to be re-crossmatched with the new sample unless an unexpected red-cell antibody is detected. We are a major trauma and transplant center, and this policy works well in our institution.

— Krishna Oza, MD
Department of Pathology
University of Arkansas for Medical Sciences
Little Rock, AR

References