

Under the Microscope

2009 Summer/Fall Newsletter

► Underfilled Specimen Tubes for PT/INR and Other Coagulation



ONE OF THE MORE COMMON PROBLEMS WITH specimens sent to laboratories is the underfilling of light blue top (sodium citrate) tubes for PT/INR and other coagulation tests. Unlike many other specimens, coagulation specimens are acceptable only when they are filled to the appropriate level (between the fill marks on the tube), and for very good reasons. Occasionally, well-meaning clinicians question the laboratory policy of rejecting underfilled coagulation specimen tubes. The purpose of this short article is to explain why this is the only appropriate policy.

Calcium in blood is an important component of the normal clotting process. In fact, calcium in times past was given the name of coagulation factor IV. The citrate anticoagulant solution in a light blue top tube prevents the specimen from clotting by binding the calcium in the blood. With the calcium bound, no clotting can occur. In coagulation tests, clotting is initiated by adding specific amounts of activators and calcium. For example, the prothrombin time (PT) test can be represented by the following formula.

Plasma + Thromboplastin + Calcium → Clot

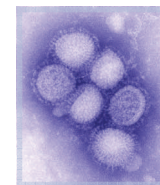
The time it takes for the clot to form is reported as the prothrombin time. If calcium is not added to the patient's plasma, no clotting occurs. If less than the standard amount of calcium is added, clotting occurs more slowly.

When a coagulation tube is underfilled, some of the citrate remains free in the patient's plasma. Then when calcium is added in the coagulation test, some

of it is bound by the free citrate rather than participating in clotting. Functionally, this is the same as adding too little calcium. Consequently, clot formation proceeds more slowly, the test result is erroneously high, and the physician may be misled to make a wrong therapeutic decision that places the patient at risk.

The bottom line is that completely filling coagulation specimen tubes to the appropriate level helps safeguard patients against inaccurate results. Requiring appropriately filled tubes for coagulation testing is the only prudent policy.

► Novel H1N1 Influenza Update



THE LABORATORY CONTINUES TO RECEIVE questions about the novel H1N1 influenza outbreak, but over the past several weeks the main question has shifted from "What should we do now?" to "What will we do in the upcoming flu season?" At this point in time, it is too early to know for sure. The answer will depend on the influenza strain or strains, incidence of infection, and information from the Utah Department of Health and CDC. Intermountain has assembled a team of experts to evaluate information and provide recommendations for prevention, diagnosis, and treatment. In any case, several principles will apply.

Stay in the information loop. Intermountain's communications will continue to be coordinated by the Chief Medical Officer, Dr. Brent Wallace. If you have not been receiving e-mails from him regarding the recent outbreak, please contact Gina Powell (gina.powell@imail.org) to get on the distribution list.

Treat the patient, not the test result. Rapid influenza tests, in particular, are subject to both false negative and false positive results. With new strains of influenza, the rates of false results are unknown. Reliance on PCR testing rather than rapid influenza tests is advisable.

Get a good specimen. No test can give reliable results unless an adequate specimen is collected. For patient safety reasons the outpatient laboratory staff is unable to collect nasopharyngeal swabs, nasal washes and nasal aspirates. Specimen collection should occur in the physician office or clinic.

If you have questions, ask. Laboratory Services staff are happy to assist with questions about specimens, tests, and interpretation of results.

► Lab Management Spotlight

SUSAN WALL IS THE HISTOLOGY Supervisor at Intermountain's Central Laboratory. She has been with Intermountain Healthcare for twelve years. Her career started in 1970 when she, immediately graduated from high school, was accepted into the University Of Utah School Of Medicine Histology Training Program. Her team provides service to physician offices within the greater Salt Lake area, processing nearly 50,000 surgical pathology cases a year, averaging 800 slides per day. To complete this workload, Susan's team is comprised of 12 histologists, 14 pathology technicians, an administrative assistant, 2 receptionists, 7 transcriptionists and 1 anatomic pathology trainer. Additionally, 2 pathology assistants work directly for the 17 anatomic pathologists.

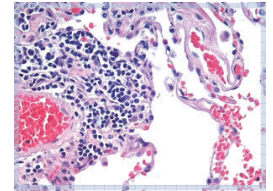


Histology is the study of tissue; pathology is the study of disease. The tissue specimen is received, accessioned, examined and dissected in the Pathology Tissue Room (aka Gross Room), then sub-



mitted to Histology. Tissue rooms reside at each Intermountain hospital and at the Central Laboratory. It is the Histology Laboratory that prepares the microscopic slides. The slides are delivered to the pathologist for diagnosis. The pathology report is transcribed and delivered to the referring physician electronically. Intermountain's turn-around-time averages 24 hours from the time the specimen is received in the laboratory.

Histotechnology is not only a science, it is an art. Under the microscope, the design of the tissue structure is beautiful; there are a variety of special stains performed and each one is a different color, but it takes a skilled hand to achieve the beauty. Staining is employed to give both contrast to the tissue as well as highlighting particular features of interest. Susan's team is consistently looking at ways to improve quality of the work it does while reducing turn-around-time, errors and cost.



► Biopsy Site Diagrams on Web-based Test Requisitions

ANATOMICAL DIAGRAMS WITH BIOPSY SITE indicators now print on Intermountain's web-based cytology / histology requisitions. These requisitions, including the diagrams, are also stored electronically in practice-specific order logs so that clinicians can review their biopsy orders later, if needed. The drag and drop indicators automatically translate the biopsy site information to text and display it as source data, giving laboratory staff ample information, both visual and textual, to process specimens reliably. Please see the sample biopsy order on the adjacent page.

If you would like more information or to see a demonstration of how this new web-based ordering tool works, including any specific features like this one, please contact your Account Manager or Scott Romney at 801-507-2208 or scott.romney@imail.org.

Cytology/Histology Requisition



REQUISITION NUMBER: **RTTESTEST10017**

PHYSICIAN 4medica Doctor	CLINIC IHC Demo Account	LOCATION CODE TESTTESTEST	CALL RESULTS TO: _____
ORDER DATE 08/20/2009	ORDER TIME 10:27:00	PHONE {801}111-1111	FAX RESULTS TO: _____
		FAX {801}222-2222	PAGE RESULTS TO: _____

PATIENT LAST NAME XTEST	FIRST NAME APPLE	MI PIE	EMMI 135802942	ENCOUNTER 26003509	SSN XXX-XX-7777	DOB 04/14/1980
ADDRESS 4646 W LAKE PARK BLVD			HOME PHONE {307}555-1212	WORK PHONE {801}535-7611	SEX M	
CITY, STATE, ZIP OLIN, IA 84121			GUARANTOR XTEST, APPLE			

BILL TO: OTHER

CARRIER NAME	PRIMARY INSURANCE	SECONDARY INSURANCE
SUBSCRIBER NAME		
POLICY#/GROUP#		
CARRIER ADDRESS		
PATIENT RELATION		

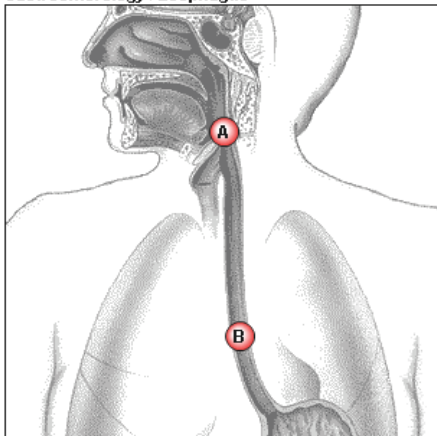
TEST CODE EBX	TEST NAME Esophagus biopsy	DIAGNOSIS CODE 784.8	STAT N
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Source: **A: Esophagus: Upper B: Esophagus: Lower** IT: 1

COLLECTION DATE 08/20/2009	COLLECTION TIME 10:30:00	COLLECTED BY	DATE/TIME/TECH CODE	
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RTTESTEST10017

Gastroenterology / Esophagus



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► Vitamin D to be Performed at Intermountain Central Lab

BY THE END OF THE YEAR, INTERMOUNTAIN

Central Laboratory will offer a serum assay for the quantitative detection of 25-hydroxyvitamin D (25-(OH) D) by EIA. This assay will quantify the sum of vitamin D2 (ergocalciferol) and Vitamin D3 (cholecalciferol). The Central Laboratory will run vitamin D assays 7 days per week with results being reported within 24 hours after specimen receipt in the laboratory.

Studies have shown that serum concentrations of 25-(OH)D is, thus far, the best indicator of vitamin D status, as it reflects the levels of vitamin D produced continuously and also that which is obtained from food and supplements.^{1,2} Recent publications have linked vitamin D deficiency to certain cancers, diabetes, cardiovascular disease, as well as to depression and schizophrenia, with serum vitamin D levels recommended for use as a predictor of bone health as well as an “independent predictor of risk for cancer and other chronic diseases”.²

There is considerable information regarding serum concentrations of 25-(OH)D associated with deficiency, adequacy for bone health and overall optimal health. It is generally felt that a concentration of <20 ng/mL (or <50 nmol/L) is inadequate. While concentrations of >200 ng/mL (or >500 nmol/L) are considered as potentially toxic. However, availability of human data remains limited.^{1,4}

More about Vitamin D

It has long been well known that vitamin D is a fat-soluble vitamin, essential for promoting calcium absorption for bone growth and remodeling. It also plays a role in the modulation of neuromuscular and immune function, as well as reduction of inflamma-

tion. Many genes encoding proteins that regulate cell proliferation, differentiation and apoptosis are modulated in part by vitamin D. There are two forms of Vitamin D which are of importance for overall health: 1) Vitamin D2 (ergocalciferol), is synthesized from plants and yeast precursors. It is also the form used most often in dietary supplements, 2) Vitamin D3 (cholecalciferol) is most active form of vitamin D. It is formed in the skin when skin is exposed to direct sunlight. The most common food source is fortified foods (i.e. cereals, dairy products and infant formulas), fish liver oils and fatty fish.³ The 25-hydroxyvitamin D assay that will soon be available at Intermountain Central Laboratory will detect both vitamin D2 and vitamin D3.

For more information:

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Phil Bach Ph.D. phil.bach@imail.org

1. Crannay C, Horsley T, O'Donnell S et al. “Effectiveness and safety of vitamin D. Evidence Report/Technology Assessment No. 158 prepared by the University of Ottawa Evidence-based Practice Center under Contract 290-02.0021. Rockville, MD: Agency for Healthcare Research and Quality, 2007
2. M Holick, “Vitamin D deficiency”, N Engl J Med, Jul 2007, 357:266-281
3. DeLuca HF, “Overview of general physiologic features and functions of vitamin D”, Am J Clin Nutr, 2004; 80:1689S-1696S
4. Institute of Medicine, Food and Nutrition Board, Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride, Washington, DC: National Academy Press, 1997.

