



# Saint Luke's Regional Laboratories Clinical Laboratory Letter



February 2011

## Blood Culture Data 2010

Saint Luke's Regional Laboratories processed 24,438 blood cultures in 2010. There were 2249 positive cultures (9%), which is comparable to previous years. The majority yielded gram-positive bacteria (68%), followed by gram-negative bacteria (24%), anaerobes (5%), and yeast (3%). A breakdown of the most common isolates is as follows:

Organism	# Isolates (%)
Coagulase-negative staphylococci	617 (27%)
S. aureus, methicillin-resistant	258 (11%)
S. aureus, methicillin-sensitive	169 (8%)
E. coli	246 (11%)
Viridans streptococci	89
Enterococcus species, non-VRE	82
Enterococcus, vancomycin-resistant (VRE)	18
Beta-hemolytic streptococci	75
Klebsiella species	71
Streptococcus pneumoniae	85
Pseudomonas aeruginosa	56
Candida species	53

Uncommon, unusual isolates for the year included *Brevibacterium sp.*, *Roseomonas gilardii*, *Clostridium difficile*, *Variovorax sp.*, *Cardiobacterium hominis*, and *Candida dubliniensis*. Additionally, 5 *E. coli* with extended-spectrum beta lactamase (ESBL) resistance were identified.

Although conserving blood draws is the ideal goal for the majority of laboratory work performed, the volume of blood drawn per blood culture remains the single most important factor in obtaining a pathogen. Numerous studies since the 1970's, and most recently by Mayo Medical Laboratories (CID: 2004;38;1724-30) have shown that the optimal blood culture volume for adults is 20-30 mL per venipuncture. Organism recovery increases by 30-50% when optimal volume is drawn. Additionally, 2-3 blood culture sets should be obtained per 24-hour period when sepsis is suspected. According to the Mayo data, 65% of non-endocarditis blood stream infections are detected with the first blood culture set, 80% with the second, and 96% with three sets. In contrast, the first culture set is usually positive in patients with infective endocarditis, due to having continuous, rather than intermittent bacteremia. Because infants and children have higher levels of bacteremia than adults, 1-5 mL of blood per venipuncture is usually sufficient for organism recovery.

Generally, the following isolates nearly always represent true bacteremia or fungemia when isolated from blood cultures, even if only one culture is positive: *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Pseudomonas aeruginosa*, *Candida* species, and enteric gram-negative bacteria such as *E. coli*. Other less commonly isolated organisms that are almost always pathogens include *Streptococcus pyogenes*, *Streptococcus agalactiae*, *Haemophilus influenzae*, *Bacteroides fragilis*, and *Neisseria meningitidis*. Enterococci are found to be significant 80% of the time. The primary organisms responsible for blood culture contamination are skin flora. Coagulase-negative staphylococci are found to be contaminants 60-80% of the time. Other common potential contaminants include viridans streptococci, *Corynebacterium* species, *Propionibacterium*, *Bacillus* species, and *Micrococcus*.

## **Xenophobia over the Xenotropic Murine Leukemia Virus**

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Murine Leukemia Viruses (MLVs) are gamma retroviruses that are widespread in animals and cause a wide range of diseases including cancer, immunodeficiency, and neurological disorders. Xenotropic murine leukemia virus-related virus (XMRV) is an endogenous MLV that infects cells from nonmouse species including humans. XMRV is unrelated to the better known human retroviruses, Human Immunodeficiency Virus (HIV) and Human T-lymphotropic Virus (HTLV).

XMRV was first reported in humans in 2006 when its genome was detected in prostatic tissue from a cohort of men with localized prostate cancer undergoing radical prostatectomy. One other study reported XMRV DNA in 6% of prostate cancer specimens. However, most subsequent studies have failed to detect XMRV in prostate cancer patients.

More recently, XMRV has also been associated with Chronic Fatigue Syndrome (CFS). In October 2009, the journal *Science* published a study from the National Institutes of Health (NIH) that detected XMRV DNA in peripheral blood lymphocytes of 67% of 101 CFS patients and 3.7% of 218 healthy controls. In contrast, XMRV was not detected in two independent studies of 186 and 170 clinically well-characterized symptomatic CFS patients in the United Kingdom nor in a third Dutch study of 32 CFS patients. A subsequent United States study conducted by the Centers for Disease Control and Prevention (CDC) also failed to detect XMRV in any CFS patients or healthy controls. Many scientists now believe that the blood samples used in the original NIH study were contaminated in the laboratory.

Given that XMRV is a retrovirus and the NIH detected XMRV in peripheral blood mononuclear cells, transmission through blood transfusion is theoretically possible. Although XMRV transmission through transfusion has never been documented, as a precautionary measure, blood establishments in several countries including the United Kingdom, Australia and Canada began deferring individuals with CFS from blood donation in November 2009. In the United States, in June 2010, AABB (formerly known as the American Association of Blood Banks) recommended that blood collecting organizations actively discourage potential donors

who have ever been diagnosed with CFS from donating blood or blood components. In December 2010 the Red Cross also decided to indefinitely defer donors who revealed a medical history of CFS. Donor screening for XMRV has not been implemented because no commercially approved/licensed tests are available and a causal association of XMRV with human disease has never been established.

In the blood banking industry, zero risk tolerance trumps evidence based medicine every time.

## **Reducing Substances in Urine**

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Detection of non-specific reducing substances in urine was begun more than 50 years ago as a screening test for inborn errors of carbohydrate metabolism in pediatric patients. The clinical basis of this test goes back to the early-to-mid 1960s when investigations showed a relationship between the presence of reducing substances in the urine of newborns, and the presence of specific sugars. The qualitative measurement of urinary reducing substances was accepted as a quick screening test of asymptomatic patients in the absence of any other screening procedure.

Clinitest was usually run as a reflex test on urine samples with a negative dipstick glucose result. A negative dipstick glucose assay and a positive reducing test suggested that some substance other than glucose was present in the urine. These sugars include galactose, lactose, and fructose. However, Clinitest was not specific for these sugars and often turned positive due to drugs excreted in urine.

Today, all states, including Missouri and Kansas, require mandatory newborn screening for more than 30 inborn errors of metabolism using tandem mass spectrometry. This testing detects galactosemia, which is the most common inborn error of carbohydrate metabolism. Other diseases of carbohydrate metabolism (except diabetes) have much lower prevalence or are clinically more benign than galactosemia and do not require screening of asymptomatic newborns. Based on this information, Saint Luke's Health System laboratories have discontinued automatic reflex testing for reducing substances in children less than 2 years of age. Clinitest will only be performed at the specific order of a physician.