Semen Analysis to Assess Male Infertility

Infertility is defined as the inability to conceive after 12 months of unprotected intercourse. Infertility affects 1 in 6 couples of childbearing age. In approximately 40% of infertility cases a female factor can be identified and in 40% a male factor. The remaining 20% of cases are due to combination of male and female disorders or remain unexplained. Semen analysis is an important step in the initial evaluation of an infertile couple. Semen analysis is also performed post vasectomy to determine if a patient has become sterile.

Semen specimens are collected at Saint Luke’s Hospital (SLH) and Saint Luke’s Northland Hospital (SLN), but are shipped overnight to Mayo Medical Laboratories (MML) for analysis. The following collection guidelines need to be followed to ensure specimen viability.

- Appointments for collection can be scheduled at SLH between 08:00 and 17:00 by calling 816-932-2424.
- Appointments for collection can be scheduled at SLN between 06:30 and 12:00 by calling 816-891-6020.
- Samples can be collected Monday through Thursday. Collections cannot occur on the day prior to a holiday.
- Patients should call 816-932-2424 before their scheduled appointment to verify insurance acceptability.
- The laboratory should be notified if the patient does not speak English so that an interpreter can be provided.
- Physician orders should specify whether the collection is being done for fertility or post-vasectomy testing.
- Patients should have 2 to 7 days of abstinence prior to collection.
- Specimens should be maintained at room temperature after collection.
- Hospital laboratory must process specimens within 30 minutes after collection.

- Specimens must arrive at MML within 24 hours after collection.

Semen analysis is performed according to WHO guidelines. Results are interpreted as follows:

- Volume of ejaculate is normally >2 mL.
- pH is normally 7.2 to 8.0. A more acidic pH suggests an abnormally high ratio of prostatic to seminal fluid.
- Normal sperm count is >20 million per mL.
- Both the percentage of motile sperm and the grade (speed) of motility on a scale of 0 to 4 are reported. Normal sperm have >50% motility and a grade of 3 or 4. A grade of 4 indicates rapid progressive movement.
- More than 70% of spermatozoa should have normal mature morphology and at least 30% should have normal oval shapes. Abnormalities in head structure are associated with poor ovum penetration.
- Germinal cell count should be <4 million per mL. A higher number of germinal cells indicates a disorder in spermatogenesis.
- Spermatozoa viability is normally >75%.
- White blood cell count is normally <1 million. Higher counts indicate genital tract infection.

If the patient will be involved in an assisted reproductive program, more stringent criteria are used to evaluate sperm morphology. This evaluation utilizes Kruger Strict Criteria which has a more direct relationship with in vitro fertilization outcomes than the WHO criteria.

Post-vasectomy semen analysis is much simpler, consisting of only a sperm count. The first specimen should be collected two months after surgery and after a minimum of 10 ejaculations. Specimens are usually tested at monthly intervals until two consecutive monthly specimens show no spermatozoa.
New IEF Method to Detect Oligoclonal Bands in Cerebrospinal Fluid

Since cerebrospinal fluid (CSF) is an ultrafiltrate of plasma, it has much lower concentrations of the highest molecular weight proteins such as IgG, IgA and IgM. Elevated CSF IgG levels can either be the result of diffusion of plasma IgG across an altered blood brain barrier or intrathecal synthesis. Patients with multiple sclerosis and other demyelinating disorders often have elevated CSF IgG concentrations due to intrathecal synthesis. One of the best methods to detect intrathecal IgG synthesis has been to examine CSF for the presence of oligoclonal bands after separation of proteins by electrophoresis. IgG in normal CSF migrates as a faint diffuse zone, but in demyelinating diseases, IgG migrates as discrete oligoclonal bands.

This past summer, the FDA approved a new method for the detection of oligoclonal bands that uses isoelectric focusing plus immunofixation (IEF) instead of electrophoresis. The Consortium of Multiple Sclerosis Centers has endorsed IEF because of its increased sensitivity (>95%). With IEF, oligoclonal bands may be detected while the total CSF IgG concentration is still within the normal range. Saint Luke's Regional Laboratories began using this method in September.

Oligoclonal bands are reported as present when they are seen in CSF but not in serum or when they are present in greater number in the CSF than in the serum. Therefore, in order for the pathologist to interpret the results, a red top tube of blood must accompany all CSF specimens submitted for a multiple sclerosis profile.

Testing Platelets for Bacterial Contamination

Blood components are sterile. However, if bacteria are introduced into donor units during collection or processing, they may multiply during storage and cause transfusion associated sepsis. Contamination of the donor unit at the time of collection is probably the most common cause of contamination. A small core of skin containing bacteria may enter the phlebotomy needle during skin puncture. Needles, anticoagulant-preservative solution or the plastic blood collection bags and tubing may become contaminated with airborne or waterborne bacteria. A less common source is a donor who has recently recovered from gastroenteritis and is asymptomatic but still bacteremic. Donor bacteremia may also occur during the incubation periods of upper respiratory tract infections and following dental procedures. The most commonly implicated organisms in descending order of frequency are Staphylococcus aureus, Klebsiella pneumoniae, Serratia marcescens, Staphylococcus epidermidis, Streptococcus viridans, Salmonella species, Enterobacter cloacae, Escherichia coli, Pseudomonas aeruginosa and Bacillus cereus.

Septic reactions are more common after platelet than red blood cell transfusions. Platelets are stored for up to five days at room temperature and provide better growth media for bacteria than do refrigerated red blood cells. Research studies have demonstrated that bacteria can be cultured from approximately 1 in 3000 platelet concentrates. However, the reported rate of fatal transfusion reactions due to bacterial sepsis has been less than 1 in a million. The risk of bacterial contamination is less for single donor apheresis platelets than for pooled random donor platelet concentrates. This is one of several reasons that hospitals in the Saint Luke's Health System try to provide apheresis platelets for all patients whenever possible.

To decrease the risk of transfusion sepsis, the American Association of Blood Banks has determined that blood centers must implement a method to detect bacterial contamination of apheresis platelets by March 1, 2004. Community Blood Center of Greater Kansas City was one of the first blood centers in the U.S. to implement bacterial culture of platelet concentrates on September 2, 2003.

Each apheresis platelet unit is cultured from the first day after collection until it outdates. If bacterial growth is detected in a unit, the blood center will immediately notify the hospital transfusion service. The hospital transfusion service will then take the following actions:

♦ If the unit has not been transfused, it will be immediately quarantined and returned to the blood center.
♦ If the unit has already been transfused to an inpatient, the transfusion service will notify the nursing unit.
♦ If the unit has already been transfused to an outpatient, the ordering physician's office will be contacted.