

# SOCIETY SCOPE

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## Clinical Laboratory Operations of the Iraqi Federal Police, Baghdad, Iraq

MAJ Kelly Wilhelms, USA; CPT Edward Keen, USA; MAJ Alfred Nader, USA

MAJ Wilhelms is a 71B Biochemist who deployed in March 2010 as the Medical Services Combat Advisor for the Headquarters Federal Police Transition Team (HQ FPTT) under the Iraqi Training and Advisory Mission, USF-I. His mission was to support, train and advise the IFP in medical operations, logistics and training.

The Iraqi Federal Police (IFP) is a 40,000 man paramilitary force under the Iraqi Ministry of Interior (MoI) that is responsible for security, counterterrorism, counterinsurgency and emergency response throughout major cities and provinces in Iraq. Their primary headquarters (HQ) is located in central Baghdad, where the IFP primary medical support structure is housed within a clinic modeled after a US Army level-2 facility. This clinic provides the basics of medical treatment, primarily in the form of sick call and limited emergency support. Further, it provides additional capabilities to include those of a basic pharmacy, X-ray, dental facility and laboratory. Staffed by three physicians and 50-80 other personnel, it is their most advanced medical facility and considered the central hub of medical treatment and logistics for the IFP. It supports three other level-2 facilities throughout Baghdad and a number of level-1 clinics throughout the IFP divisions and brigades within the Iraqi provinces. For more advanced care, the IFP transfer or redirect incoming patients to local hospitals located throughout the districts of Baghdad or other provincial cities that the IFP encompass (e.g., Mosul, Samarra).



**Iraqi Federal Police.**

### Laboratory Operations

The laboratory at the IFP HQ provides basic testing to support general sick call and health assessments routinely performed by the physicians. The laboratory staff ranges from 5-7 personnel, to include an OIC (2<sup>nd</sup>

*Con't on pg 5*

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# Editor's Page

Greetings fellow SAFMLS members, I hope that everyone had a wonderful summer. Now that autumn has arrived, it is time to start preparing for our next annual meeting. The 2012 SAFMLS Annual Meeting will be held 1-6 April 2012 at the Marriot in downtown Memphis Tn. This is a new venue for us, with loads of nearby attractions, and I am looking forward to experiencing the culture and opportunities available in Memphis. However, SAFMLS meetings are more than just a recreational opportunity. We are a professional organization with a charter to provide continuing education and professional development to our members in areas related to medical laboratory science and military leadership. It is largely Society members who provide this education via workshops, short topic presentations, leadership meetings and posters. To those of you who habitually present at our meetings, Thank You, and I hope you continue to contribute. We would not succeed in our mission without you! If you have not presented in the past, this is your opportunity to make a difference. On a regular basis, we all do important work in the military medical laboratory science field; please take the time to educate your peers by showcasing your work at SAFMLS. Please check the SAFMLS website, [http://www.safmls.org/annual\\_meeting\\_information.html](http://www.safmls.org/annual_meeting_information.html), for details on workshops, short topic, and posters guidelines and application submission requirements. The deadline for abstract submission is 15 December, so now is the time start thinking through what to present, developing objectives, and drafting an abstract.

The success of SAFMLS and our annual meetings is attributable, in large part, to the dedicated efforts of a few key individuals. The SAFMLS board of directors and the annual meeting's planning committee are crucial to maintaining this success in the years to come. In 2012, the board will need the following new members, President-Elect (Army Nominee), Vice President-Elect (Navy Nominee), Army, Navy, and Air Force Members-at-Large and an Enlisted Member-at-Large (any service). If you want to be a part of the SAFMLS BOD and help lead the Society in the future, please nominate yourself. Guidelines are available on the website at the link mentioned above.

It is also time to consider which SAFMLS members are deserving of recognition by the Society. Please take the time to nominate those deserving members for one of the many annual SAFMLS awards. Guidelines for awards are on page 26 of this newsletter.

Another opportunity for our members to contribute is through submission of professional articles to this newsletter. Please take the time to author something for the Scope. Professional writing is one of the skill sets expected of a military officer, the Scope is a great opportunity to work on that skill. This issue is loaded with some great articles contributed by SAFMLS members. Please take the time to read "Clinical Laboratory Operations of the Iraqi Federal Police, Baghdad, Iraq" written by MAJ Kelly Wilhems. There are also review articles on Diabetes and Thyroid disorders, both will bring you up to date on the current state of laboratory support in the diagnosis and management of these diseases. Lastly, be sure to check out the timely article on Managing Lab Contracts by 1SG Lopez.

Enjoy this issue and start preparing for Memphis!

LTC Paul Mann



# President's Message

Maj MaryBeth Luna

Welcome to another edition of the Society Scope! As we are putting together this newsletter, plans are already underway to make next year's annual meeting a resounding success. Our Vice President, LTC Eric Lee, has gathered a contingent of fine volunteers to ensure the success of our inaugural visit to Memphis, Tennessee. Many of you have already embraced this year's theme, "Lead, Collaborate, and Educate" by stepping forward and helping LTC Lee as a SAFMLS Planning Committee member. To those who have already volunteered, I salute you! To those who are still pondering the thought, I urge you to take the leap and join us in this worthwhile endeavor.

Collaboration is the first step to leading change. By working with fellow laboratorians towards a common effort (such as SAFMLS), we establish networks that will serve as the catalyst for change. I implore you to come forward and take the first step towards these professional alliances by joining the Planning Committee, running for a position on the Board of Directors, or assisting SAFMLS in any way possible. Leading change does not have to have a title; assistance in any capacity is greatly welcomed and is **your** first step in networking with health professionals. These networks will be vital as you progress towards further cooperative efforts with fellow professionals.

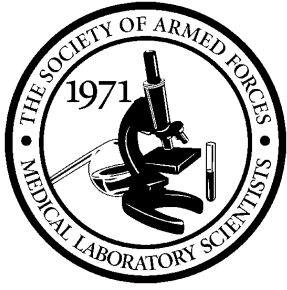
You will be pleased with the accommodations provided by the Memphis Marriott Downtown and the spaciousness of the Memphis Cook Convention Center. The convention center is located just across the street from the hotel and Beale Street—the location of Memphis' famous barbecue and southern blues music—is just a short walk away. Thank you to our site coordinator, Maj Jeannette Watterson, for making this meeting a reality.

As we draw closer to the end of the year, let's keep in mind the feverish work being done behind the scenes to keep our Society alive and relevant. Enjoy the upcoming season, but be ready to leap forward and assist. Remember, many hands make light work.



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## Consultant's Corner

Col Ron Hickman

In the fall of 2004, the Base Realignment and Closure (BRAC) committee officially announced that San Antonio military medical centers would integrate their inpatient services at Brooke Army Medical Center (BAMC) and Wilford Hall Medical Center (WHMC) would become an ambulatory surgery center. The challenge ahead, how to integrate two of DoD's largest medical centers to meet the needs of San Antonio Military Medical Center (SAMMC) and Wilford Hall Ambulatory Surgery Center in support of the San Antonio Healthcare System (SAMHS) and beyond. The integration of BAMC and WHMC labs reached beyond San Antonio as both labs serve as military reference labs. In the fall of 2005, lab leadership met with lab consultants and architects to assist with the integration process. After many months of discussions, the product line subject matter experts pounded out integration and facilities plans for the future.

Over the last five years the SAMHS BRAC integration has been and continues to be a challenging experience. In September 2011, the last WHMC inpatients were moved to SAMMC and WHMC was designated as an ambulatory surgery center. As the medical centers integrated under BRAC there have been several lessons learned and observations made along the way. First, clear organizational goals and transparent communication from top leadership down are especially critical due to the frequency of military personnel turnover. Without transparent communication personnel can only speculate where the organizations are going. Established command and control rules of engagement are vital as product lines are integrated and teams work through the integration process. Secondly, the culture of each service varies based on the service's unique missions, fortunately when compared to our line counterparts most medical missions are more similar. Understanding each service's culture is critical to the integration process. A familiarity of each service's acronyms and jargon is also helpful, when the acronyms and jargon start to fly it almost sounds like different languages. Each service needs to be familiar with the other's system for evaluating its personnel and the rating chain must be reviewed. Every effort should be made to ensure evaluation reports are properly completed on our personnel. Thirdly, standardized medical training needs to be made across the DoD; a critical review of the scope of practice for each specialty would be beneficial to ensure the standardized training transfers into the field. Finally, as workloads are transferred between MTFs, a standardized method to capture transferred workloads and execute reconciliation to maximize capabilities and capacities to create a more efficient healthcare system in support of the integration process.

In today's environment the trend of joint basing and shared resources will continue to increase as budgets and resources diminish across the DoD. We must learn from the BRAC and other joint sharing activities and strive to understand the uniqueness of each service to create an environment that fosters collaborations across the Military Healthcare System. Collaborative efforts are a must to leverage capabilities and maximize capacities to increase efficiency and decrease costs. The 2012 annual SAFMLS meeting is just around the corner and provides an excellent time for all services to get together to learn about the uniqueness of each service and foster future collaborations.

*Con't from pg 1*

Lieutenant), two other 2<sup>nd</sup> Lieutenants and about 4 Shurta (police). The educational background of the laboratory staff ranges widely, from having a Bachelors Degree in a biological science (Biology, Microbiology) to virtually no formal education outside of training provided on site. The laboratory is typically staffed by one person during the day with another on-call for evening and night. At times, it is vacant due to conflicts between clinic and police missions, sickness or other factors.

They are minimally equipped; possessing a pair of centrifuges, a phlebotomy chair, microscope, spectrophotometer, ESR stand with tubes, a few pipettors and a kitchen refrigerator/freezer. More recently, they purchased a laminar flow hood for the development of microbiology testing (see training section). Their consumables are as limited and generally consist of kits/reagents purchased from the local market, expired serum or EDTA tubes, a few boxes of rarely used gloves, some pipette tips and a limited number of glass slides.

Phlebotomies are generally performed using a syringe and expelled into an open tube. Once collected, the tubes are spun and the sample transferred to a microcentrifuge tube for assay. Within their limitations, the laboratory executes a short test menu:

<b>Cholesterol</b>	<b>Glucose</b>	<b>ABO Typing</b>	<b>PCV</b>
<b>Triglyceride</b>	<b>Uric Acid</b>	<b>Typhoid Ab</b>	<b>ESR</b>
<b>BUN</b>	<b>CREA</b>	<b>Urine Microscopy</b>	

The majority of the tests are intended to support routine examinations. Chemistries are performed using kits that employ a manual spectrophotometric method. Urine microscopy is rarely performed and always without a reagent strip test. An ESR setup is employed routinely and PCVs measured using a plastic MicroHCT reader. Typhoid Ab testing is used on occasion due to the endemic presence of the disease within the region – some cases which end up in the clinic. Each year, the Ministry of Health (MoH) distributes a portion of Typhoid vaccine to the MoI whom, in turn, distributes a portion to the IFP. The IFP administer the vaccine and subsequently perform random testing to determine its effectiveness. A more recent development in the policies of the senior physician has led to the ABO typing of every IFP member that comes through the clinic. A basic kit test is employed and the results recorded in a log book for future reference if needed.

Quality Assurance, standard operating procedures and good laboratory practices are a relatively foreign concept to the staff. Quality Control is run on a limited basis; when performed, it is as directed by assay kit instructions and the results not recorded. The maintenance of records is virtually non-existent with the exception of test results. Results are hand written onto paper and then given to the patient or physician for keeping in medical records.

Even with the lack of equipment, supplies and advanced methods, the laboratory is an enormous source of pride for their Command and staff alike. For example, during an occasion where the Kurdish Zerevani



**Federal Police HQ Main Clinic, Baghdad, Iraq**



**2LT Ali (OIC) with SFC Newton, HQ FPTT medic.**



**Specimen collection.**



**Unique method of tracking QC cutoffs.**

**Sample prep.**

Command visited the HQ, the IFP Commanding General (CG) included the laboratory in the site tour. There, the IFP CG had his blood drawn and a PCV run as a demonstration of their capabilities.



Command tour of laboratory.



2LT Hosam measuring the CG's PCV.

## Training

In August 2010, HQ FPTT proposed a multi-disciplinary clinical laboratory training opportunity to the IFP senior physician. He readily accepted and sent out a request to all IFP divisions for attendees.

Collaboration was made with the 28<sup>th</sup> Combat Support Hospital out of Camp Sather to train the IFP in basics of clinical microbiology. CPT Edward Keen, 71A Microbiologist, was brought in as the subject matter expert. After an on ground assessment to determine what the IFP senior physician desired in the instruction, training began mid-September. CPT Keen provided a 2-day session, training 8 students through PowerPoint and hands-on exercises.



CPT Keen instructs IFP students in microbiology.



Gram Stain demonstration.

The basics of specimen collection and handling, testing options and an overview of disease states and causative organisms were discussed in an open forum presentation. The last half of each day was spent in the laboratory. On the first day, CPT Keen instructed the students on Gram Stain procedure. He demonstrated technique, allowed each student to prepare and stain slides and then worked with them to view their results. The following day, CPT Keen instructed basic stain and visualization of malarial parasites in blood smears and shared a meal with the students in the IFP dining facility. Subsequent to this training, the IFP procured Gram Stain reagents and a laminar flow hood to work toward testing in their own laboratory.



Students at work.

The following training session focused on general laboratory principles and clinical chemistry. MAJ Wilhelms provided a 1-day overview of topics ranging from the phases of testing with focus on specimen integrity, quality assurance/control and basics of clinical chemistry to include markers of clinical states. This instruction was somewhat difficult; most students had never worked under any strictures or guidelines to ensure quality of results. As such, they did not easily comprehend the concepts presented.

The final training session was conducted in December, in collaboration with the 86<sup>th</sup> Combat Support Hospital out of Camp Sather to provide instruction in clinical hematology. MAJ Alfred Nader, 71E Clinical Laboratory Officer, was brought in as the subject matter expert. Following another on-ground assessment, MAJ Nader provided two days of training, instructing 6 students through PowerPoint and hands-on exercises.



**Instructors, linguists and students.**



**MAJ Wilhelms and linguist Milad.**



**DFAC.**



**Pre-analytical variables instruction.**

The basics of red and white blood cells, hematopoiesis, and a review of disease states were discussed in an open forum presentation. As before, the last half of each day was spent in the laboratory. On the first day, MAJ Nader demonstrated slide preparation, staining and visualization of cells. The second day focused on practice of slide preparation/staining and the identification of basic white blood cells in a specimen. During this time, MAJ Nader presented the senior officer with a gift that was graciously accepted – a chart of RBC morphology which was subsequently placed on the laboratory wall. Afterwards, he also had the opportunity to share a meal with the students in the IFP dining facility.



**Specimen volunteer.**



Slide prep instruction.



MAJ Nader instructs on WBCs.



Instructors, linguists and students.

Overall, the students were highly motivated to learn and the training deemed a success by the Iraqis and instructors alike. The greatest difficulty encountered in training was associated with the language barrier, particularly in the light of technical language. However, it was found that students often learn English words when it comes to scientific terms – many do not translate into Arabic easily (if at all). It was observed that the even main linguist employed throughout the training (a medical student) had difficulty in translating of many concepts. These issues were partially overcome using a team approach. The senior physician of the IFP is fluent in English and was able to assist. Further, the students themselves, when one understood the concept being conveyed, would speak to the class to clarify.

To facilitate USF-I's ongoing efforts to disseminate positive stories related to Coalition/Iraqi partnerships, the microbiology and hematology training sessions were documented by Public Affairs personnel. These stories were reported in AMEDD newsletters and, in one instance, a version translated into Arabic and disseminated to the Iraqis.

## Progress and the Future

Recent changes in funding policies at the Iraqi ministerial level have allowed the IFP clinic to make recent purchases and improvements. With the collaborative training that HQ FPTT and the Combat Support Hospitals provided, their laboratory staff is enthusiastic about their potential to expand their capabilities in the future. However, funding in clinics such as this will tend to be driven toward the purchase of medications and consumables to support general medical treatment. The progress of this laboratory will continue to be strongly influenced by internal and external politics and the feast or famine approach to funding that is endemic in the Iraqi system.



DFAC.

## **TYPE 2 Diabetes: Clinical Laboratory Basics**

Maj Paul Eden, USAF

Diabetes, from the Greek word “siphon”, has been a known disease for hundreds of years. Physicians were unable to do anything to combat this epidemic and therapies varied widely, such as prescribing a diet of jelly of viper’s flesh, broken red coral, and fresh flowers of blind nettles [1]. Up to the early 20<sup>th</sup> century physicians’ only way to identify the disease was to literally taste the urine to see if it was “sweet”. Fortunately, the discovery of insulin as well as the development of more sophisticated glucose testing has enabled providers to bring this disease under some control.

Diabetes is a disease classified as a defect in glucose metabolism characterized by a lack of insulin production, a defect in insulin action, or both. Type 2 diabetes mellitus (T2DM) affects 25.8 million people in the United States [2], approximately 8.3% of the population. According to the Centers for Disease Control approximately 465,000 people between the ages of 20-44 were newly diagnosed with diabetes in 2010. Approximately 67% of diabetics over the age of 20 suffer from high blood pressure, and the risk for stroke is 2-4 times higher for diabetics than non-diabetics [3]. In addition, as of 2008 diabetes was the #7 leading cause of death in the US, the leading cause of kidney failure, and in 2007 the DoD spent over \$124 million to treat 160,386 cases of diabetes [4]. This makes this disease one of the growing concerns among military services as younger segments of the population are diagnosed with this disease. The amount of research that has been put forth for this growing epidemic is staggering, both from a treatment and a diagnosis standpoint. Clinical testing for early diagnosis and preventative treatment of this disease has become a priority in many medical communities, including those in the U.S. military healthcare system.

Diabetes mellitus is typically categorized into type 1, gestational, and type 2 diabetes mellitus. Type 1 diabetes mellitus is an autoimmune disorder frequently called insulin-dependent diabetes (IDDM) and reflects a lack of insulin production by the patient. The cause of type 1 diabetes is destruction of the insulin-producing cells of the pancreas. This disease often afflicts those under the age of 18 and requires insulin to maintain control of the patient’s glucose metabolism.

Gestational diabetes is a specialty class of diabetes that is seen in approximately 18% of pregnant women, according to the American Diabetes Association [5]. Women who have not previously suffered from T2DM sometimes develop this disease, although it is not fully known why. Some speculate that this may be due to the hormone changes in a woman caused by placental growth that interferes with insulin regulation of blood glucose. Because this disease does not have a direct causative factor most women are asked to perform an oral glucose tolerance test, typically around the 24<sup>th</sup> week of pregnancy, in order to identify the disease and treat prior to significant impact on the mother and infant. According to the CDC women who have had gestational diabetes have a roughly 35-60% higher chance of developing type 2 diabetes within the following 10-20 years [2].

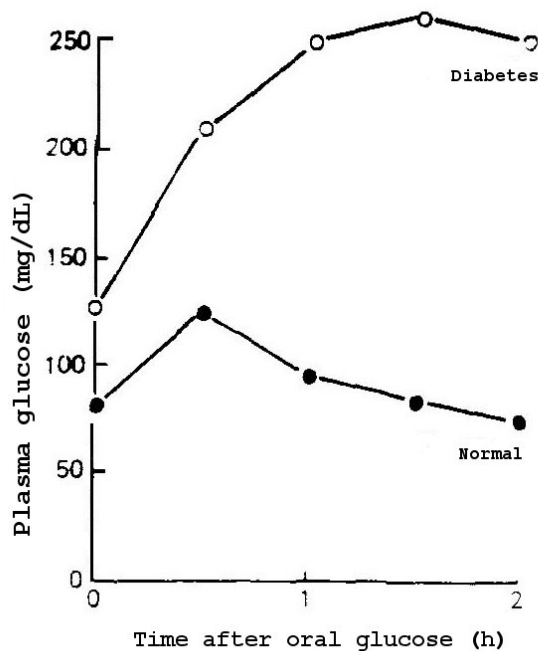
Type 2 diabetes mellitus, also called non-insulin dependent diabetes (NIDDM) is far more common in adults and takes longer to diagnose. During initial stages of the disease insulin production is normal, although for a variety of reasons its ability to manage glucose metabolism is hindered. This inability to effectively regulate glucose results in the patient developing an increased production of insulin to compensate for the lack of sensitivity in managing glucose regulation. Eventually even increased insulin production is unable to compensate for the lack of insulin sensitivity and blood glucose levels rise. Compounding this problem is the rise in obesity seen in many parts of both the civilian and military populations. Often the overload in glucose is dumped into the adipose tissue, causing the cells to essentially become overfilled. This expansion of the adipose results in abnormal expression of some hormones and a resultant decrease in insulin sensitivity, setting up a vicious cycle. Adipose increases cause decreased insulin sensitivity and the insulin inadequacy results in excess blood glucose being dumped into the adipose.

A developing segment of the diabetes epidemic is termed prediabetic. In addition to the 8.3% of the United States population affected by T2DM an estimated 35% of the American population above the age of 20 had prediabetes in 2010 [2]. This calculates out to roughly 79 million Americans. Prediabetes is classified by a fasting blood glucose of >100 mg/dL but less than 125 mg/dL by the American Diabetes Association [3]. Below is a table that defines, according to the American Diabetes Association, fasting blood glucose levels that are indicative of diabetes:

Normal	<100 mg/dl
Prediabetes	100-125mg/dl
Type 2 diabetes mellitus	>126mg/dl

While there are several physical and biochemical symptoms that can be used to diagnose someone with T2DM as laboratorians we typically see only the blood or urine tests. The most common tests used to identify a possible case of type 2 diabetes mellitus are the fasting blood glucose and the oral glucose tolerance test. Laboratories see fasting blood glucose tests under several different circumstances, not only for diabetic workups. However, a major symptom of type 2 diabetes development is an elevated fasting glucose, at least 126 mg/dl according to the ADA. This single point test does not require multiple phlebotomies and the patient can come in first thing in the morning before getting breakfast and be done.

The oral glucose tolerance test, while more comprehensive, incorporates additional challenges for both the patient and the phlebotomist. The basic principle is to take a fasting patient, draw baseline blood glucose, then have them intake a specified amount of glucose, typically 75 g. Afterwards the patient has their blood draw repeated at 1 and 2 hours post ingestion (sometimes 3 hours post as well) in order to track the metabolism of that glucose bolus out of the bloodstream. What one expects is a spike at 1 hour post and a significant decrease at 2 hours post, such as you would expect to see after eating a meal and the body has incorporated the additional glucose into the tissues. Normal values for the 2-hour glucose tolerance test are less than 140 mg/dl at the 2 hour timepoint. Glucose values between 141-199 mg/dl are considered prediabetic and results above 200 mg/dl are considered indicative of diabetes. This graph demonstrates the difference in this test between response from a diabetic patient and a non-diabetic patient [6]:



Challenges that are typically seen with this test include nausea, missed blood draws and proper patient tracking. Not having eaten for several hours and immediately drinking down what basically constitutes a can of soda can cause significant discomfort in some people. Additionally, repeated blood draws can be difficult for tough sticks, not only for the phlebotomist but for the patient as well. Finally, all blood draws are specifically timed, a feat that can be tough to keep track of if the collection staff is tracking several of these patients simultaneously and managing a busy waiting room. However, this test does give the best indication of current ability for the body to shepherd glucose into the tissues.

The hemoglobin A1C test is a primary method of tracking long-term glycemic control for physicians. This test averages glucose management over the previous several weeks and lets the doctor know if the patient's diabetes is under good or poor control. However, in recent months it has become more commonplace for this test to be used not only to track those who have been diagnosed with T2DM but to screen those at risk for the disease. According to the ADA a hemoglobin A1C above 6.5% is considered a criteria for possible diagnosis of T2DM [7]. The benefit of this test is that it does not require a fasting blood sample. It does, however, typically require an EDTA-anticoagulated blood tube, so using the same draw tube as for most clinical chemistry test is not possible. As this test is considered by many physicians to be the best way to track glycemic control it has been on the rise in frequency of testing at many clinical laboratories. At

Keesler Air Force Base Medical Center, for example, the number of hemoglobin A1C tests performed in the past year has increased 11.4% for outpatients.

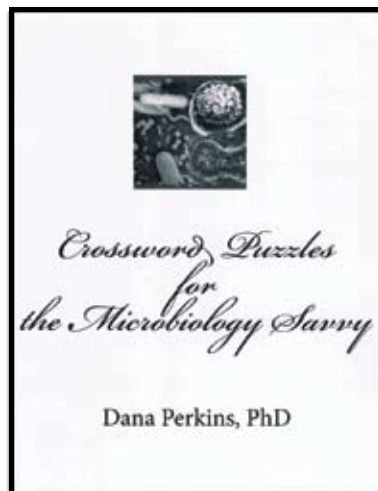
Several other clinical laboratory tests can be considered as indicators for T2DM. A non-fasting blood glucose above 200 mg/dl, positive glucose in a random urinalysis, or a hemoglobin A1C above 5.7% are all possible indicators [7], however the glucose tolerance test and fasting glucose tests are typically used by physicians to clinically diagnose the disease, along with physical and demographic indicators. Metabolic regulation tests such as insulin are obviously helpful but these are rarely ordered on a routine basis due to higher costs as well as turnaround time in some facilities. In addition, non-specific indicators of inflammation such as c-reactive protein or indicators of possible adipose dysregulation such as abnormal fasting triglyceride levels could point towards diabetes.

T2DM frequently results in increased cellular inflammation in the adipose and several specialty tests are under consideration in the research community as possible biomarkers for progression towards disease. Markers for inflammation such as TNF- $\alpha$  or IL-6, tests for adipose dysfunction such as leptin or adiponectin, and tests for pancreatic function are just a few that are being explored for possible development and implementation in clinical laboratories.

Obviously there is a great deal that can be said about type 2 diabetes mellitus and not all of it will fit here. However, as laboratorians it is important to know how best to identify current trends. Diabetes is on the rise all over the world and the newly diagnosed are getting younger every year. Through early identification and treatment this epidemic can be managed and allow our military families to continue to lead rich lives.

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## Crossword Puzzles for the Microbiology Savvy



*Medical Microbiology*  
*Bioterror Level: High*  
*Famous Scientists I & II*  
*Hemorrhagic Fever Viruses*  
*Herpes Simplex Virus*  
*History of AIDS*  
*Notifiable and Surveillable Diseases*  
*Respiratory Tract Infections*



*Rickettsia*  
*Staphylococcus*  
*Streptococcus*  
*Therapeutics*  
*Toxins*  
*Vaccines*  
*Virology, Immunology, Etc.*  
*Virus-Host Interaction*

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## Clinical Lab Contract Cost Savings

By First Sergeant Jorge L. Lopez, MT (AMT)

Laboratorians have always been innovative. Part of our mantra in high complexity testing has been our critical thinking. Looking forward, a perennial shift will be occurring among our service laboratories. Terms such as ‘GWOT funding’ should be a thing of the past. This catchy phrase described a temporary resource that funded everything from contractual employee work to new testing platforms. With budget constraints on the horizon and for the foreseeable future, all laboratory leaders need to fully understand the impending balancing of books – if you haven’t already. We will need to account for every single dollar spent in the lab. Recently, Defense Secretary Leon Panetta testified before Congress and couldn’t answer the question of the Pentagon’s accounting practices.<sup>1</sup> The short answer – it will be fixed by 2014. Our labs will be required to do the same.

Since military labs are not usually accountable for meeting personnel cost constraints, testing reagent, supply, and equipment contracts are the largest controllable percent of our budget dollars. As such laboratory management needs to tightly manage contracts so we can ensure responsible use of defense dollars. Being good stewards of our assigned funds requires detailed management of contracts and services. With multiple work center sections in the laboratory, it is essential to grasp the details of all types of contracts in order to manage them appropriately. Monitoring the performance and administration of most contracts is a contract officer representative (COR) responsibility – and the process needed to manage correctly is time consuming and a learned process. One responsibility is to ensure each contract has adequate funds assigned and that excess funds are deobligated, this can yield precious year end funds that can be utilized for other clinical services. Additionally, reviewing invoices to match packing lists or services provided is a tedious and a very lengthy process,, however this often brings to light overcharges in billing. This is a great way to audit and balance contract supply numbers and ascertains hidden charges and recently, there have been billing discrepancies noted in the DoD Reference Lab contract. These overcharges can seem relatively minor at first glance, but when added up throughout the year the nickels and dimes can become hundreds, possibly thousands of dollars.

Everyone should be familiar with CPT (cost per test) and CPRT (cost per reportable test). Both offer advantages and disadvantages depending on the size of the laboratory, number of tests performed, type of platform, assays, and the list can go on. This should be nothing new to lab managers and enlisted advisors. A detailed view of contract negotiations can paint a broken system in favor of the vendor. What could we possibly be missing?

Many vendor representatives will not disclose ‘contract term discount’. Although most vendors are honest, it is important to remember whom they represent and what their bottom line is. Uneducated managers will never benefit from this if we simply don’t know and ask. For each contract term, we can negotiate a discount. Major testing platform contracts usually run for five years (year one is the base year followed by four option years) while other minor testing platforms or individual supply contracts run year to year. If we ever have the privilege to institute a new testing platform, this discount will surely save money. For each contract term year, a minimum of 1% discount should apply. Year one will yield no discount; year two will yield 2%; year three 3% and so forth to year five at 5%. These percentages add up to substantial savings over the life of the contract.

Finally, volume discounts can apply to both CPT and CPRT contracts. A vendor should give you the tier pricing for the minimum and maximum test and how the volume discount applies to the tier. On a CPT contract, expect a higher discount to the tune of 40% for the highest tier. On a CPRT, discounts can be expected depending on the commitment for a given assay. Similarly, CPRT contracts can be adjusted on a semi-annual basis if testing volume differs from original contractual commitment – do not leave it up to the vendor to tell you of the adjustment. Currently USAMMA is attempting to leverage DoD wide laboratory purchase volumes to negotiate cost per test contracts designed to be available via ECATS.

Our innovative minds need to search for ways to ensure we are accountable for the resources used in every area of the lab. Although what was noted here represents a snapshot, lab supervisors have a tall order to make certain processes are continually evolving to maximize our return on investment. Any contract is a challenge, but lab techs should be up to the task to ensure our stewardship of government dollars is well spent.

<sup>1</sup> Panetta promises Pentagon audit [http://www.cnn.com/2011/10/13/politics/pentagon-audit/index.html?hpt=po\\_bn1](http://www.cnn.com/2011/10/13/politics/pentagon-audit/index.html?hpt=po_bn1)

# Laboratory Testing in the Assessment of Thyroid Function

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## Introduction

In the diagnosis and management of thyroid disorders, laboratory testing is a critical component in providing accurate and cost-effective medical care. In some instances, clinical suspicion of a thyroid disorder may be strong prior to confirmation through laboratory testing. However, the majority of cases are subtle in presentation, requiring cytopathologic and/or biochemical testing to detect a disorder. The following review presents an overview of thyroid physiology, current literature and published guidelines for laboratory testing to support diagnosis of thyroid disorders. Further, general information regarding the principles of thyroid hormone testing are reviewed to educate the clinical laboratorian on the use and shortcomings of current methodologies. Of focus, guidance from the National Academy of Clinical Biochemistry (NACB), the American Thyroid Association (ATA) and from recent publications is presented to assist in the appropriate development of testing capabilities and guide development of laboratory support algorithms for diagnosis and treatment monitoring.

## Hypothalamo-Pituitary-Thyroid Axis

The hypothalamo-pituitary-thyroid axis (HPT axis) consists of three major structural components, the hypothalamus and pituitary gland located at the base of the brain and the bi-lobular thyroid gland positioned in the lower anterior neck. These structures produce thyrotropic-hormones that cascade in an open feedback loop which control a number of regulatory functions, to include tissue production, metabolic rate and neurologic development among others. In a normally functioning axis, the hypothalamus releases from the median eminence thyrotropin-releasing hormone (TRH) which, in turn, acts on the anterior pituitary gland to stimulate production and secretion of thyroid-stimulating hormone (TSH). TSH stimulates the thyroid gland to increase synthesis and release of thyroid hormones. These subsequently act in a negative feedback loop to reduce the secretion of the tropic-modulators.

Within the thyroid gland, thyroperoxidase (TPO) converts dietary iodide to iodine which is then integrated in the protein thyroglobulin (Tg). In the presence of TPO, these iodinated residues combine to form protein bound triiodothyronine (T3) and tetraiodothyronine (T4) which are released into circulation by the action of TSH.

Once released, the majority of released T3 and T4 are bound by circulating proteins. These major binding proteins include thyroxine-binding globulin (TBG), thyroxine-binding prealbumin (TBPA) and albumin. Further, while in circulation, approximately 80% of T4 undergoes metabolism (1). In the liver, kidney and brain, T4 is metabolized into the higher activity T3 and the metabolically inactive reverse T3 (rT3). This metabolic action provides additional control over thyroid hormone activity and synthesis independent of the TRH/TSH cascade.

## Disease States

Dysfunction of the HPT axis (thyroid dysfunction) is generally classified as hyper- or hypothyroidism. In hyperthyroidism, thyroid hormone is in excess whereas the hypothyroid condition manifests a thyroid hormone deficiency. Thyroid dysfunction is further classified into overt and subclinical manifestations. While standard definitions exist for each type, classification of subclinical disease is influenced by genetic set-points for thyroid hormone sensitivity and thus is somewhat arbitrary for diagnoses (2) (3) (4).

Hyperthyroidism is one expression of the generalized hyper-thyroid state termed thyrotoxicosis (1). Non-hyperthyroid thyrotoxicosis may be caused by various forms of thyroiditis, hormone ingestion or the presence of ectopic thyroid tissue (e.g., metastasized tumor). In contrast, primary hyperthyroid thyrotoxicosis results from the presence of TSH-receptor antibodies (Graves' thyrotoxicosis), toxic adenomas or toxic multinodular goiters. Both categories exhibit decreased concentrations of TSH in the presence of high free T4 (FT4). In contrast, central hyperthyroidism exhibits moderate to high concentrations of TSH concurrent with high FT4, such as the case of a TSH-secreting pituitary tumor. Patients experiencing thyrotoxicosis manifest fatigue, weight loss, heat intolerance, nervousness, insomnia and palpitations/tachycardia among others.

In primary hypothyroidism, patients exhibit elevated concentrations of TSH with decreased FT4. Causes include the presence of autoantibodies such as those in Hashimoto's thyroiditis, excessive iodine intake, hypopituitarism due to tumors or tissue destruction, thyroidectomy and subacute transient thyroiditis. In central hypothyroidism, concentrations of TSH are relatively low in the presence of decreased concentrations of FT4. However, subclinical hypothyroidism exhibits, by

definition, normal concentrations of FT4 in the presence of elevated TSH and presents in up to 8.5% of a given population (3) (5). Patients experiencing hypothyroidism manifest fatigue, weight gain, cold intolerance, depression, muscle cramps, goiter and infertility among others. In addition, hypothyroid patients may exhibit otherwise unexplained hyponatremia, anemia and hyperlipidemia.

**Laboratory Testing**

Analyte	Clinically Significant Shift	Table 1. Clinically significant shifts in thyroid-related analytes during therapeutic monitoring (6).
Total T4	2.2 µg/dL	
Free T4	0.5 ng/dL	
Total T3	35 ng/dL	
Free T3	0.1 ng/dL	
TSH	0.75 µIU/mL	
Thyroglobulin	1.5 ng/mL	

Within the HPT axis, a variety of potential targets are available to detect and confirm overt and subclinical thyroid disorders. With each of these tests, as with all analytical procedures, reference ranges (normal concentrations) should be available and appropriately validated for the population served. Based on intra- and inter-individual variability studies, age-specific ranges are generally not required for adults (6). However, recent studies may suggest otherwise; evidence exists that elderly persons exhibit age-dependent decreases in TSH concurrent with increases in FT4, presenting challenges in thyroid assessment of this population (7) (8) (9) (10). In addition, differences are considerable in children; specific reference ranges should be employed for neonates, infants and children through the age of 14 years (6) (11). To circumvent difficulties in establishing age-specific reference intervals, conversion factors may be employed to convert validated adult ranges to those suitable for children (6) (11). In addition, due to the wide variety of potential thyroid abnormalities, trimester-specific reference intervals should be available for testing in pregnant patients (6).

In addition to detecting dysfunction, therapeutic treatment is primarily monitored through the use of laboratory tests. During courses of treatment, the laboratory may be called upon to assist in interpretation of assay results. Using known reference intervals and calculated inter- and intra-biological variability, estimated clinically significant shifts in concentration have been determined for several assay monitors, presented in Table 1 (4) (6) (12). These may be considered one of many sources by which to assist physicians in thyroid test interpretation.

Instrument	µIU/mL	Table 2. Reported functional sensitivities of major vendor clinical TSH assays (package inserts).
Abbott Architect	≤ 0.004	
Beckman-Coulter Dxl	≤ 0.010	
OCD EciQ	≤ 0.014	
Roche Cobas	≤ 0.014	
Siemens ADVIA Centaur	≤ 0.008	

*Thyroid Stimulating Hormone*

Based on genetically defined factors, TSH exhibits a log/linear response to minor fluctuations in FT4, making it the single most reliable and sensitive monitor of thyroid function in patients with stable thyroid status (5) (6) (13). It is commonly used to detect overt and sub-clinical thyroid disease, monitor hospitalized patients with non-thyroidal illness (NTI) and detect/verify a number of other clinical manifestations of thyroid dysfunction.

Since the development of immunometric TSH assays in the 1970s, performance has progressed rapidly; 1<sup>st</sup> generation assays with functional sensitivities of 1.0-2.0 µIU/mL gave way to 2<sup>nd</sup> and 3<sup>rd</sup> generation assays, the latter with a functional sensitivity of 0.01-0.02 µIU/mL (14). These advances, coupled with the identification of subclinical thyroid disease, have had a profound effect on the normal range of TSH in euthyroid patients, shifting from 2.0-15.2 to 0.4-4.0 µIU/mL over a 20 year period (14). As such, controversy regarding an appropriate TSH reference range has occurred with potential modifications having unclear results on detection and treatment algorithms (8) (15) (16) (17).

TSH assay quality is historically related to the ability to distinguish euthyroid concentrations (0.4-4.0  $\mu\text{IU/mL}$ ) from those typical of overt Graves' thyrotoxicosis ( $< 0.1 \mu\text{IU/mL}$ ) (14). More recent criteria include functional sensitivity as a component of assay quality. In general, functional sensitivity is defined as the lowest concentration where interassay precision possesses a coefficient of variation (CV) of 20% (6) (14). This is further extrapolated as being the appropriate lower limit of assay reportability (as opposed to analytical sensitivity or lower limit of detection). Validating functional sensitivity within the user's system is critical; manufacturers often employ pure serum matrices in validation assays, operating conditions that are not representative in the routine laboratory (Table 2). Typical of most assays, a number of iatrogenic factors may shift perceived concentrations from that which is present. Known interferents influencing TSH include medications (e.g., glucocorticoids, lithium carbonate), elements of NTI and heterophilic antibodies (HAMA) among others (18).

NACB Guidelines for TSH Testing	
<ul style="list-style-type: none"> <li>✓ Use the most sensitive assay available, reliable functional sensitivity <math>\leq 0.02 \text{ mIU/mL}</math>.</li> <li>✓ Due to potential interferent activity leading to missed hypothyroid states, less sensitive (e.g., fast TSH) assays should not reflex to more sensitive ones.</li> <li>✓ Age- and pregnancy trimester-specific reference ranges should be validated for the method in use and available for reference.</li> <li>✓ Care should be taken in establishing/validating reference intervals to avoid patients with thyroid autoantibodies, family history of thyroid disease, goiter or interfering medications.</li> </ul>	<p>Table 3. Considerations for laboratories performing TSH testing (6).</p>

### *Triiodothyronine and Thyroxine*

In patients with unstable thyroid status, circulating FT4 is a more reliable indicator of thyroid status (2). For example, FT4 is more appropriate for patients in the early months of hormonal status re-equilibration during thyroid dysfunction treatment (6). Further, discordant TSH concentrations associated with hypothalamic or pituitary abnormalities (e.g., chronic hyper-thyroid pituitary thyrotroph hyperplasia) are more reliably monitored through use of FT4. High FT4/TSH ratios may be observed in pregnant patients due to TSH-like activity of human chorionic gonadotropin (hCG), resulting in gestational transient thyrotoxicosis (GTT) in approximately 2% of pregnancies (6). Moreover, FT4/TSH ratios may be employed in assessing post-partum thyroiditis and patients exhibiting non-compliance to thyroid dysfunction treatments. Testing for free T3 (FT3) may be employed to screen for Graves' hyperthyroidism, TSH-secreting pituitary tumors and thyroid hormone resistance syndromes. Further, FT3 is useful to detect iodide deficiencies which characteristically exhibit low T4/T3 ratios (6).

Testing for TT3 and TT4, while less common, is employed in a number of situations where free hormone measurements may be suspect. For example, patients that possess altered TBG affinities and/or abnormal T4-binding proteins should be assessed using total hormone measurements. For example, in patients with genetic binding protein abnormalities such as familial dysalbuminemic hyperthyroxinemia (FDH), TT4 and the FT4-index exhibit supra-normal values. In hospitalized patients, high or paradoxically normal TT3 concentrations may be an indication of hyperthyroidism that may require intervention. In addition, total thyroid hormone testing may be indicated during pregnancy due to the wide fluctuation in binding protein concentrations that occur with increased sensitivity to pregnancy-induced hormonal cascades. Moreover, patients with suspected Graves' hyperthyroidism exhibit characteristically high TT3/TT4 ratios (6).

While total hormone assays are less complicated to develop, free hormone assays are typically preferred due to extensive variability of circulating concentrations of thyroid hormone binding proteins. In the normal patient, over 99.9% of thyroid hormones are protein bound; the active component remaining free in circulation (1). In the presence of binding proteins, testing procedures that employ equilibrium dialysis provide the most accurate results. However, these require extensive processing times, additional capabilities/materials and generally increase associated costs. In the routine clinical

laboratory, high-throughput immunoassays for free thyroid hormones are susceptible to various influences by circulating concentrations of binding proteins (6). This influence relegates most assays to free hormone estimates as opposed to a direct measure; in the presence of high protein concentrations, FT4 is typically overestimated and vice versa. In addition, medications can have marked effects on the affinity of thyroid hormones to TBG and other proteins. For example, phenytoin and carbamazepine displace T4 from TBG. Further, patients treated with heparin may exhibit elevated FT3 and FT4 due to its influence on concentrations of free fatty acids (FFA) which liberates these hormones from circulating binding proteins (19). This effect suggests caution be taken in the assessment of heparinized plasma specimens that have been stored.

Index methods (FT3I, FT4I) combine a total thyroid hormone concentration (TT3 or TT4) and a thyroid binding protein measurement to establish a free hormone estimate. In use since the 1950s, the Thyroid Hormone Binding Ratio (Uptake test) employs a TT3 or TT4 test in combination with equilibrium assays using trace amounts of labeled T3 or T4 to indirectly estimate TBG concentrations. Based on its principle, higher concentrations of labeled thyroid hormone will bind in the presence of high TBG due to reduced saturation of TBG by T4. The opposite is observed with low TBG concentrations. An alternative method uses the ratio of TT4 and TBG to estimate FT4. However, theoretical advantages of using a direct TBG measurement are overcome by unpredictable changes in binding capacity such as those observed in cases of NTI or other abnormal physiological states. Further, TBG only represents 60-75% of total binding capacity for thyroid hormones, excluding other clinically significant binding proteins (2).

In the instance discordant FT3 or FT4 assays are reported or observed, technical investigation should be conducted using a different assay method as binding protein influences tend to be method specific. In addition, FT3 and FT4 assays generally employed in the clinical laboratory should not be diluted. Theoretical calculations suggest 100-fold dilution of a normal patient's specimen would result in less than 2% decrease in perceived concentration due to changes in thermodynamic equilibrium (6).

<b>NACB Guidelines for FT3 and FT4 Testing</b>	
<ul style="list-style-type: none"> <li>✓ <b>Have readily available information on drug interactions and diagnostic accuracy.</b></li> <li>✓ <b>Check questionable results for interference using an alternative manufacturer's method.</b></li> <li>✓ <b>Establish a procedure where questionable results may be confirmed through Total hormone measurements or reference methods (e.g., equilibrium dialysis).</b></li> <li>✓ <b>Age- and pregnancy trimester-specific reference ranges should be validated for the method in use and available for reference.</b></li> </ul>	<p>Table 4. Considerations for laboratories performing FT3 and FT4 testing (6).</p>

*Thyroglobulin*

Circulating Tg concentrations are non-specific indicators for thyroid dysfunction, typically of benign origin. Factors that determine concentrations of Tg include inflammation or injury to the thyroid gland (leakage), stimulation rate of the TSH receptor and mass of differentiated thyroid tissue present (6). The primary use of Tg measurements is as a tumor marker for patients with differentiated thyroid cancer (DTC) where two-thirds of cases exhibit elevated concentrations. In monitoring of post-operative DTC patients, Tg is measured concurrent with a TSH stimulation test to increase overall sensitivity in detecting residual or metastatic DTC.

NACB Guidelines for Thyroglobulin	
<ul style="list-style-type: none"> <li>✓ <b>Changes in Tg assay must be coordinated with physician users to ensure the method is suitable and to allow time to re-baseline patients.</b></li> <li>✓ <b>Physicians should be notified of the potential (and direction) of interference of TgAb on the current or proposed Tg assay.</b></li> <li>✓ <b>Reports should include commentary regarding the potential for interference by TgAb.</b></li> <li>✓ <b>High-dose hook effects may be encountered in patients with excessive elevation of Tg.</b></li> <li>✓ <b>Reference ranges using stringent subject criteria should be established for each locale due to influence of iodide intake on Tg concentrations.</b></li> </ul>	<p>Table 5. Considerations for laboratories performing thyroglobulin testing (6).</p>

### Autoantibodies

In autoimmune thyroid disease, autoantibodies induce thyroid dysfunction through immune mediated cellular damage or stimulating/blocking actions on cell membrane receptors. Three major autoantibodies are typically described in thyroid disease; these include TPO antibody (TPOAb), Tg antibody (TgAb) and Thyroid Receptor antibody (TRAb).

TPOAb and TgAb are commonly present in most forms of autoimmune thyroid disease. The pathological effects of TgAb are not fully known and not generally associated with disease alone; however, it may be useful in the detection of iodide deficiency in the presence of nodular goiter and is used for monitoring iodide therapy (20). In addition, TgAb is useful in the monitoring and treatment of DTC. In patients with DTC, all specimens sent for Tg testing should have concurrent TgAb measures as low concentrations commonly interfere with Tg assays. Moreover, TgAb may have prognostic applications for monitoring response to treatments and may be used to detect recurrence of DTC in patients thought disease-free (6) (21).

TPOAb is monitored to assess risk for thyroid dysfunction during pregnancy, post-partum thyroiditis and development of complications during administration of therapeutic drugs such as amiodarone, interleukin-2, interferon-alpha and lithium (6). Further, it is detected early in the development of hypothyroidism secondary to Hashimoto’s thyroiditis and in most cases of Graves’ disease. It is a risk factor for hypothyroidism in those with Down’s syndrome and recent evidence suggests that children from mothers that possess detectible TPOAb have increased risk of impaired cognitive development. Further, TPOAb may play a role in infertility leading to miscarriage or failure of *in vitro* fertilization (6) (22) (23).

Measurement of TRAb is typically employed to determine the etiology of unexplained hyperthyroid states. TRAb tends to present in patients who currently have or possess history of Graves’ disease and may be used to establish and monitor treatment algorithms for the condition. It is also employed in the assessment of fetal/neonatal risk for thyroid dysfunction through placental transfer of TRAb. Assays for TRAb are markedly hampered by heterogeneity of the antibody within affected patients. Current detection methods include cell bioassays, TSH binding inhibiting immunoglobulin assays and recombinant receptor assays. In general, low analytical correlation exists between most current methods.

<b>NACB Guidelines for Thyroid Antibody Testing</b>	
<ul style="list-style-type: none"> <li>✓ <b>Thyroid antibody test results are highly method dependent.</b></li> <li>✓ <b>Functional sensitivity should be established or confirmed for each assay.</b></li> <li>✓ <b>Reference intervals are highly method and population dependent and should be validated using a young, male subject population without autoimmune history, goiter or family history of thyroid disease.</b></li> <li>✓ <b>Concurrent testing for TPOAb and TgAb in iodide-sufficient regions is not necessary or cost efficient – TPOAb is typically most effective for detecting thyroid autoimmunity.</b></li> <li>✓ <b>Run TgAb with every Tg test performed on patients with DTC.</b></li> </ul>	<p>Table 6 . Considerations for laboratories performing thyroid antibody testing (6).</p>

**The Laboratory-Physician Interface**

Quality laboratory support for accurate and cost-effective diagnosis of thyroid dysfunction is of critical importance (Table 7). However, the need to offer high quality analytical methods that support diagnosis of both common and unusual thyroid dysfunction in the local population may be in conflict with funding constraints that require broad implementation of cost-saving measures. To ensure quality of care is maintained in a diverse patient population, laboratory managers should establish active collaboration with physicians using these services. This collaboration should leverage logical, cost-effective sequences of testing strategies to assess thyroid-related disease and/or discordant test results (6). It is critical to note that lack of awareness of test method limitations or misinterpretation of results can lead to serious medical errors. Some examples include (6):

- Presence of thyroid hormone autoantibodies, thyroid hormone resistance or undiagnosed FDH leading to inappropriate thyroid ablation.
- Inappropriate treatment or missed diagnoses of T3-toxicosis or other hypo- or hyperthyroid conditions on the basis of drug or NTI-related interferences.
- Failure to diagnose or inappropriate treatment of DTC due to TgAb interference on Tg results.
- Failure to recognize neonatal thyrotoxicosis due to drugs given to a mother for Graves’ disease.

<b>NACB Guidelines for Laboratories</b>	
<ul style="list-style-type: none"> <li>✓ <b>Have data readily available for assay principles, drug interactions, reference intervals, functional sensitivities, detection limits and interferences for the methods in use.</b></li> <li>✓ <b>Ensure an alternative laboratory is available for specialized testing and for investigation of discordant results using alternative assay methods.</b></li> <li>✓ <b>Work with physicians to develop reflex testing algorithms to improve cost-effectiveness of thyroid testing strategies.</b></li> <li>✓ <b>Where required, educate physicians on thyroid test limitations and ensure relevant clinical information is provided to facilitate appropriate testing/interpretation of results.</b></li> </ul>	<p>Table 7. General considerations for laboratories performing thyroid testing (6).</p>

In conclusion, it is critical for laboratory professionals to develop an optimal, open interface with physicians to assess thyroid testing and results. Garnering clinical feedback and providing educational opportunities for the end user enables both the laboratory and physician to understand its opposite and recognize the consequences of diagnostic error due to misunderstanding of assay limitations, interferences and lack of communication (24).

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## **SOCIETY OF ARMED FORCES MEDICAL LABORATORY SCIENTISTS 2011 BOARD OF DIRECTORS MID-YEAR MEETING MINUTES MEMPHIS, TN, MEMPHIS MARRIOTT DOWNTOWN 25 AUGUST 2011**

1. **Call to Order:** The meeting was called to order by the Society President, Major Marybeth Luna at 0809 CST.

2. **Attendance:**

**Members Present:**

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Maj Marybeth Luna, USAF, BSC, President  
LTC James E. Lee, MS, USA, Vice President  
Maj Denise Lennon, USAF, BSC, Treasurer  
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LtCol Imelda Catalasan, USAF, BSC, Air Force Member-at-Large  
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Voting Board Members:

Col Bailey Mapp, USAF, BSC, Air Force Ex-Officio/Consultant

Non-Voting Board Members:

CAPT Mike Finch, MSC, USN, Webmaster  
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LCDR Aaron Harding, MSC, USN, President-Elect

**Members Absent:**

LCDR Corey Jenkins, MSC, USN, Navy Member-at-Large  
CPT Vanessa Melanson, MS, USA, Army Member-at-Large  
CPT Jennifer Evans, MSC, USA, Army Member-at-Large  
SGM Jesus Perez, USA, Enlisted Member-at-Large  
Col John Hickman, USAF, BSC, Air Force Ex-Officio/Consultant  
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LTC Paul Mann, MS, USA, SCOPE  
LtCol Richard Schoske, USAF, BSC, P.A.C.E. Coordinator

3. **Introductions** – Mr. Griz Adams with Thermo Fisher Immunodiagnostics, formally Phadia, opened the meeting to enforce his company's desire to assist with plans for future SAFMLS events. Mr. Adams stated that his company wishes to continue sponsoring an evening social event as in the past. He does request for his company to be included in the pre-Annual Meeting venue plans so his company can accommodate the social event accordingly. His recommendation for a Fun Run rain plan is to have a "Cross Fit" program provided the venue has accommodations. To plan T-shirt requirements for the Fun Run, Mr. Adams solicited assistance from the BOD in brainstorming how to get T-shirt sizes in advance;

perhaps during the online member registration for the Annual Meeting. The Webmaster seems to think this will not be difficult to do. It was also suggested to make these T-shirts available for distribution as the participants check in to receive their Annual Meeting packets.

**4. Minutes of the Previous Meeting** – LCDR Milavec. There was no old business from the previous meeting to address. All open new issues from the previous meeting were addressed during this meeting.

**5. Treasurer’s Report** – Maj Lennon. The following balances were reported by the treasurer:

1. Checking: \$90,145.62
2. Money Market: \$38,220.02
3. Outstanding income expected from RegOnline is approximately \$15,000

**6. Secretary’s Report** – LCDR Milavec

- a. The past dues list was scrubbed. Five people were on the list. Four paid upon being reminded by The Secretary. One member was cancelled.
- b. Individuals registered in RegOnline but did not submitted applications. Those individuals were reminded on 27 July to submit an application. The deadline of August 19 did not yield any application from these individuals. Their memberships were cancelled and their names forwarded to Maj Lennon for proper membership reimbursement on 16 Sep 2011.

**Total members: 481**

Officers: 338, Enlisted: 85, Civilians: 29, Emeritus: 29

Army-211, Air Force-133, Navy-72, PHS-7

Members with current dues: 481

Members with delinquent dues: 0

**7. New Applicant Review** – LCDR Milavec. 5 membership applications were submitted from members of the Army; 4 Officers, 1 Civilian. The BOD voted on all applicants. All were approved by the BOD for Regular Membership. The secretary updated the RegOnline membership status for these individuals and ensured letters, certificates and coins were mailed to each accordingly.

**8. SAFMLS 2011 Planning Committee** – LTC Lee.

- a. LTC Lee has ideas on the people he wants for each job on this committee. Without going into detail with this list of individuals, he stated he would provide Maj Luna a list.
- b. He expects all Members-At-Large to assist with the plans for the opening ceremonies.
- c. The Key Note speaker is locked on.

**9. OLD BUSINESS:**

- a. Coin Sales – Sales were huge on-line. Coins sold out leaving some without getting theirs who purchased one. Due to how the coins were purchased online, it was impossible to determine who purchased a coin. It was discussed to send an email out to determine who ordered a coin and use the honor system to refund the money or utilize the feedback form as a method to determine who needs a refund. (CLOSED)

CAPT Finch, webmaster, attempted to identify those who did not receive coins by members’ word (honor code) and ensured refunds were executed via RegOnline. It was very difficult to identify who reserved and paid for a coin and who did not. CAPT Finch stated that there needs to be a way to track who gets their coin. While

discussing coins, it was mentioned that SAFMLS is in need of more coins. LtCol Catalasan will order new coins using the current design used. It was undetermined at this meeting how many coins to order. LtCol Catalasan stated she would obtain price breaks and email the BOD with the information in order to determine an appropriate number of coins to order.

- b. Distinguished Guests – Does the Society give distinguished guests a gift? A suggestion was made to give an old SAFMLS coin. (CLOSED)

Yes, the Society does provide gifts to distinguished guests. This is a responsibility of the President.

- c. Members-at-Large Responsibilities - Members-at-Large must ensure members assigned to manage the registration booths are accounted for and report for duty at their designated days and times. Members-at-Large should also function as social directors by assisting with locating restaurants, locating military discounts, etc at annual meeting locations. In all it was suggested that the Members-at-Large duties should be redefined. (CLOSED)

Chair of the Planning Committee should engage Members-At-Large for assistance. The BOD needs to ensure its giving direction on their tasks. Duties are defined in the By-Laws. At the Post Annual Meeting discuss with the elected Members-At-Large what their duties are. This discussion should be on the agenda for all future Post Annual Meeting minutes.

- d. Onsite SAFMLS Registration - Booths should remain open until the last day and manned by one person to cover. It was suggested that a central repository of materials should be maintained when registration desks are removed. (CLOSED)

Ensure there is built in space for SAFMLS registration booths. The booths should remain open until the break-out sessions begin. For those booths that remain open, it is preferable to man those with at least two individuals.

- e. Outgoing Member Plaques – Outgoing members for 2010 did not receive their plaques. LCDR Gaskin will send names to Maj Hendricks for mailing – Maj Hendricks. (OPEN)

Maj Hendricks neither has the plaques nor the names. LCDR Milavec will email LCDR Gaskin to request that she send the names to Maj Hendricks so he may process the 2010 plaques.

- f. Paperless Electronic Device Usage – LCDR Harding presented a device, “Spot Me,” to the BOD for consideration for use at future annual meetings by the attendees. This device is used to manage the attendee’s entire conference/symposium experience. Estimated cost is \$60,000. More information will be provided during the Mid-Year Meeting – LCDR Harding. (OPEN)

The reception for this proposal was lukewarm at the meeting. Some members expressed concerned over whether or not this is something SAFMLS can afford. An idea was suggested to try out this technology at a future meeting using a core group of people to use and critique. LTC Lee asked Maj Watterson to query the vendors on Spot Me and collect feedback. Would the vendors be willing to pay for the services in lieu of SAFMLS paying for the service? LCDR Harding agreed to review the financial piece and research other similar technologies on the market. The BOD agreed not to use this technology for the Memphis meeting.

## 10. NEW BUSINESS:

- a. SAFMLS Post Meeting survey results – CAPT Finch. In general most attendees liked the meeting. There were some issues that did arise which could not be controlled. Some notable feedback is as follows: (CLOSED)
1. Some stated their disappointment with being charged the non-member Annual Meeting rate even though they had submitted membership applications which were approved at the Annual Meeting.

2. Lack of participation at the Business Meeting was noted. It appears attendees leave after the Ceremony because they in part misunderstand the expectation of their attendance. It was suggested during the Mid Year Meeting to switch around the first day's schedule to have the Business Meeting first and then follow into the ceremonial and key note speaker programs. Reorganization of the opening days would include providing the attendees with a slide show of those candidates running for BOD offices and allow attendees to vote so by the end of the opening ceremonies, the new incoming board can be announced.
  3. Scheduling was painful. Service-specific scheduled events conflicted with the SAFMLS schedule. The BOD agreed that these service-specific events held during SAFMLS workshops and short topics detracted from the educational aspect of the Annual Meeting. BOD approved the proposal to request that each service plan their events during times that do not block or conflict with regularly-scheduled SAFMLS events during the Annual Meeting.
  4. Short topic times ran over. It is essential that short topic speakers be given ample information they are only to speak 20 minutes, if a 30 minute session or 50 minutes for a 60 minute session. It is essential there is enough transition time between short topics for the attendees.
  5. Variety of catering choices for the snack periods could either be expanded and/or have healthier snack options available.
  6. Participants stated they would like to have had hand-outs on the different talks they were attending. The Planning Committee will look into the possibility of requesting presentations and/or hand outs in advance from the presenters for the attendees' use.
- b. Phadia's Desire to Host a Party at Memphis/Ethics on permitting vendor-sponsored events at the Annual Meeting. This question was raised in April when Maj Watterson mentioned to the Board that Phadia was interested in organizing and hosting another evening party at the Memphis meeting – Maj Watterson. (CLOSED)

Events sponsored by vendors are considered "private parties" and SAFMLS is considered a private organization and chartered as a Nonprofit Organization by the state of Virginia. The BOD determined that it would welcome and consider any exhibitor's desire to sponsor an event at SAFMLS. Each request will be viewed, considered and a collective decision made as those requests are received.

- c. Does SAFMLS require the use of a post office box address? – Maj Watterson. (CLOSED)

SAFMLS must maintain an official, consistent business address. Col (ret) Nancy Boriack agreed to relinquish the SAFMLS post box responsibility. LCDR Aaron Harding has agreed to take responsibility of the post office box. Maj Luna coordinated this transfer.

- d. Use of the Society Scope to allow for non-laboratory/professional organization advertising. A question was raised in May when Mr. Dan Brown, a retired USAF Colonel who is currently a realtor/broker, asked LTC Mann if he could advertise in the Society Scope – LTC Mann. (CLOSED)

The BOD decided to determine advertising on a case-by-case basis. In general the BOD felt the advertising should have some military relevance and/or be science-related in some fashion. The President will maintain the responsibility of determining relevance and to permit the advertisement or not.

- e. Proposed Bylaws change to reflect honorary members and emeritus members as being exempt from paying dues – CAPT Finch. (CLOSED)

The BOD reviewed this proposal and unanimously approved.

- f. Proposed Bylaws change to allow the BOD to conduct official Society business electronically to vote on new memberships in order to expedite membership approvals – CAPT Finch. (CLOSED)

The BOD reviewed this proposal and unanimously approved. This responsibility will be on the Secretary to ensure applications are scanned and emailed to the BOD on a monthly basis for voting. The first e-vote will commence in the month of September.

- g. Discuss how the Society may be able to attract fresh presenters – CAPT Finch. (CLOSED)

Presentations will be reviewed earlier and vetted by the Planning Committee to determine relevance and weed out repetitive presentations that crop up from year to year. Approval of presentations for SAFMLS will be the responsibility of the Planning Committee Chair.

- h. Proposal to use the SAFMLS website as an educational resource for those individuals who cannot attend the Annual Meeting. Presenters would need to be willing to share their presentations and quizzes. P.A.C.E. credits can be awarded to those who complete the on-line workshops – LCDR Harding. (OPEN)

LCDR Harding stated he would discuss this possibility with LtCol Schoske, P.A.C.E. Coordinator.

- i. 1<sup>ST</sup> Sales is a provider of tradeshow lead retrieval services. Their *GroupTag* scanners can be used to take attendance at workshops and can be used to validate attendance in order to create P.A.C.E. certificates. No handwritten attendance rosters are necessary – LCDR Harding. (OPEN)

LCDR Harding will take the lead on assessing 1<sup>st</sup> Sales. May consider using this outfit for the Memphis meeting to assist with gathering P.A.C.E. rosters and certificates. LCDR Harding will explore the possibility of getting the exhibitors to pay for the service vice SAFMLS.

- j. The Treasurer expressed dissatisfaction with the bank used by SAFMLS, Armed Forces Bank. Maj Lennon is looking at alternatives but has specifically identified Chase Bank as the best alternative. She will provide her research and will ask the BOD to vote on a new banking institution – Maj Lennon. (OPEN)

- k. Consideration for fresh Annual Meeting sites was mentioned. In choosing future SAFMLS Annual Meeting sites, airfares, accessibility (major airport hubs), per diem rates if available at all, size of venue among other things are part of the equation. In considering the 2015 site the choices were narrowed down to Washington, D.C. or San Diego. Orlando and Miami were considered. It was determined Orlando would offer too many tourist distractions and the Miami location would not be large enough – Maj Watterson. (OPEN)

11. With no further business, the meeting was adjourned at 1614 CST.



## CALL FOR NOMINATIONS FOR 2012 SAFMLS BOARD POSITIONS

- **Open Positions:** President-Elect (Army Nominee), Vice President Elect (Navy Nominee), Army/Navy/Air Force Members-at-Large, Enlisted Member at Large (Any Service)
- Nominee must be a regular member of SAFMLS, not anticipating retirement within the next year, and must be willing and able to attend board meetings.
- Send the following NLT 1 Mar 12 to the SAFMLS Secretary, LCDR Stacie Milavec at [secretary@saf-mls.org](mailto:secretary@saf-mls.org)
  - Nomination Letter
  - Letter of Intent (1 page)
  - Picture (electronic preferred)
  - CV (1 page)
- The Officers of the Society shall be, by order of succession, President, Vice-President, Treasurer, and Secretary. A conscious effort should be made to effect multiple agency representation among the Officers of the Society and under no circumstances will the President be from the same service for more than two consecutive terms.
- The Officers and a President-Elect shall be elected annually from among the commissioned officers of the Society by majority vote during the Business Session at each Annual Meeting, with the exception of the Treasurer and Secretary, who shall be elected for a three-year term.
- The Officers shall take office at the conclusion of each Annual Meeting, and shall be responsible for the affairs of the Society during the following year, and for the conduct of the succeeding Annual Meeting.
- The President-Elect will serve as a Society President the year following the term of office of the current President, and shall serve during this interim period as a non-voting member in all meetings of the Board of Directors, unless the President-Elect qualifies as a voting member under Articles IV or V or the Bylaws.
- The Vice President, in the event the President is unable to serve, shall assume all of the President's functions.
- There shall be seven Members-at-Large, each elected for a period of two years. Six of the seven Members-at-Large shall be Commissioned Officer Members, with not more than two members from any one service. In addition, one term for each service will expire each year. The seventh Member-at-Large will be an Enlisted Member representing any service. Each Member-at-Large will have one vote.

**DEADLINE: 1 MAR 2012**

## SAFMLS 2012 ANNUAL MEETING NOMINEE REQUIREMENTS FOR SAFMLS AWARDS

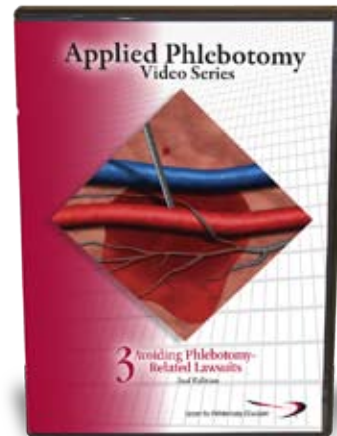
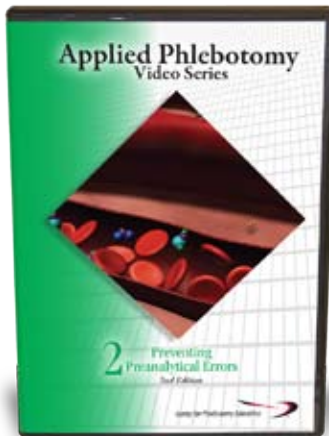
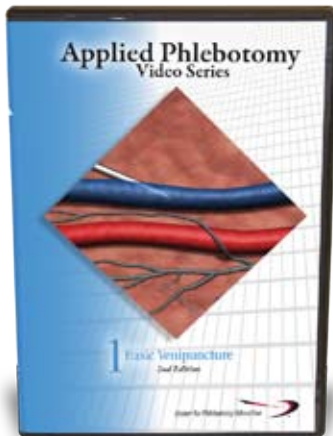
- Nominees **must be a regular member of SAFMLS** (enlisted nominees may be associate members) with a **minimum time of one year** as a member of SAFMLS **prior to nomination**. **Nominees must be a member in good standing (dues paid in full) to be nominated for ANY SAFMLS award.**
- Must be in the appropriate pay grade at time of award receipt
- Accomplishments cited must be within three calendar years of nomination date
- Individual has not received the award for which they are being nominated in the past three years
- May be nominated for any accomplishments that advance the practice of clinical laboratory medicine at the laboratory, installation, or headquarters level to include but not limited to:
  - Leadership
  - Management
  - Job knowledge
  - Innovation
  - Resource savings
  - Training
  - Contributions to laboratory medicine
  - Impact on medicine
  - Professionalism
  - Significant non-laboratory accomplishments will be considered, but only as they apply to the whole person concept
- Activities promoting SAFMLS are viewed in a positive manner. These may include but are not limited to:
  - Committee membership
  - Written contributions to the newsletter
  - Workshop/Short Topic presentations
  - Poster presentations
  - Annual meeting committee involvement
- Nominations for the award **must include** which award you are nominating the person for **AND:**
- Brief biographical sketch of nominee not to exceed one type written 8 ½" X 11" page
- Description of accomplishments limited to two double spaced 8 ½" X 11" pages with one-inch margins and type no smaller than 11 characters per inch.
- No bullets – written paragraph formatting

Submit nominations NLT 15 December 2011 to the Awards Committee Chairperson. Awards can be sent via email in PDF format to:

[Linda.Guthrie@us.army.mil](mailto:Linda.Guthrie@us.army.mil)

**NOMINATIONS MUST BE RECEIVED BY 15 DEC 2011**

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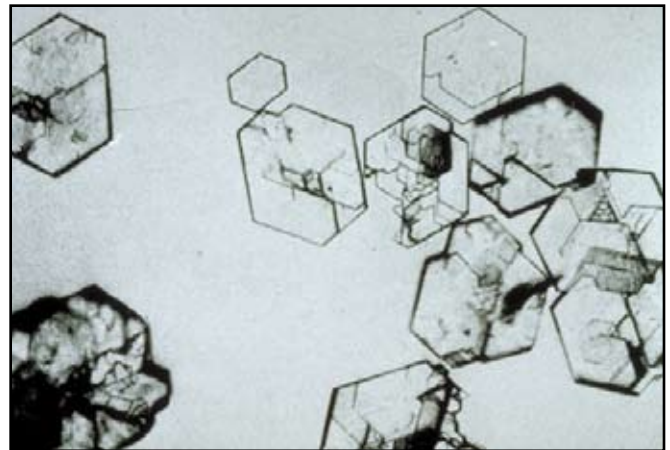
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# Just for Fun

## Guess the Unknown

A 23 year old female with a history of urinary discomfort and renal stones was evaluated the in Emergency Room for severe lower back pain. The patient vitals were: BP of 106/68, pulse was 88, respirations were 28, and temperature was 97.2. Labs were unremarkable with the exception of the UA. Results listed below:

<b>Test</b>	<b>Patient Result</b>	<b>Reference Range</b>
Color	Yellow	
Clarity	<b>Cloudy</b>	
Glucose	neg	(negative)
Bilirubin	neg	(negative)
Ketones	neg	(negative)
Sp. Gravity	1.028	(1.005-1.030)
Blood	<b>2+</b>	(negative)
pH	<b>8.0</b>	(5.0-8.0)
Protein	<b>2+</b>	(negative)
Urobilinogen	1.0	(0.2-1.0)
Nitrite	neg	(negative)
Leuk. Esterase	<b>2+</b>	(negative)
RBC	<b>10-20</b>	(0-3)
WBC	<b>25-50</b>	(0-5)
Epithelials	<b>75</b>	(none)
Hyaline cysts	2-3	(<10)
Bacteria	1+	(negative)
Crystals	<b>cystine 1+</b>	(negative)



**Microscopic picture of the crystals**

What type of crystals are these?

What is the disorder known as and what is the cause?

Is this disorder the likely cause of previous renal stones?

The answer to the previous Guess the Unknown is *Fusobacterium necrophorum* & the disorder is known as Lamierre’s Disease

*Bonus Question:* What US City is mentioned in more songs than any other city in the world – more than 400 - according to Billboard magazine.



**MEMBERSHIP APPLICATION**

(Please print or type all information)

Name		Rank/Grade
Branch of Service	Duty Status: Active <input type="checkbox"/> Reserve/NG <input type="checkbox"/> Civilian <input type="checkbox"/> Retired <input type="checkbox"/>	Corps
Duty/Business Address		Phone
Home Mailing Address		Phone
E-mail Address		

**EDUCATION**

Institution, City, State	Dates Attended	Major	Degree	Laboratory Science* Credit Hours

\*Biochemistry, Laboratory Management/Administration, Medical Technology, Anatomical Pathology, Clinical Pathology, Toxicology, Microbiology, Cytology, Biomedical Research, etc.

**CERTIFICATIONS, REGISTRATIONS, LICENSURES (DATES)**


**MEDICAL LABORATORY WORK EXPERIENCE (Military/Civilian)**

Location	Position Title	Dates



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# Calendar of Events

## Future SAFMLS Meetings

### 2012

Memphis, TN

### 2013

St. Louis, MO

### 2014

Reno, NV



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### NEW DEADLINES for SAFMLS Society Scope:

Winter	Vol X Number 1	Deadline: 1 Dec
Summer	Vol X Number 2	Deadline: 1 Apr
Fall	Vol X Number 3	Deadline: 1 Aug

[www.safmls.org](http://www.safmls.org)

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