2017 CAMLT CONVENTION: “A Smart Partnership”
Annual Meeting at Santa Clara Hilton September 15-17
Filled with Information and Fun!

It was a bustling three days of workshops, meetings, exhibits and social events. The opportunity to meet with our peers is always a highlight. As always, CAMLT and the Convention Committee sincerely thank our sponsors: Abbott Diagnostics Division-Hematology, ARUP Laboratories, Beckman/Coulter, Bio-Fire Diagnostics, Bio-Rad Laboratories, Diagnostica Stago, Inova Diagnostics, Precision Biologics, Roche Diagnostics, Sysmex America, Tripbeat, UCSF School of Nursing, and our own Eastland, East Bay and Fresno Chapters.

The workshops offered almost every laboratory discipline. Some of the topics offered were: A Foundation for Accurate Blood Smear Reviews, Where are We Now With Gluten, Sepsis Management, Case Studies in Hemostasis, Multiplex PCR Panels for Infectious Diseases, Advanced Antibody Identification, MLT Workforce Research and Policy, and The Science of Alzheimers. As you can see, this was an awesome meeting.

The House of Delegates is the business meeting for our association. Some of the highlights included approval of the revised Bylaws. The new document is extremely well done, easy to follow and will serve us well in the years to come. An afternoon breakout session was held to evaluate how we do business and how we can improve by spending less time while accomplishing more. In addition, officers were nominated and the elections were held. There are still two spots open on the board. Want to know more about filling one of these openings? Contact the office and we will get back to you right away. This past year CAMLT has continued working on our strategic plan to upgrade our organization and appeal to our young members and the current generation of future leaders.

continued on page 3
WHAT KIND OF VOLUNTEER ARE YOU?

- Are you a thinker? Would your friends say you are passionate or compassionate?
- Are you a doer? Would your friends say you are a team player or an individual activist?
- Do you feel most alive making one-on-one connections or talking with a group?

At CAMLT you can be a mentor, teacher, team player or activist..... so volunteer now...send an email to office@camlt.org with your contact information, interests, and best way to contact you.

As I begin my third year as CAMLT president, I am so very proud to serve with all of the other officers and committee members of our organization in its 78th year. I would like to thank the many long-term members who have been the backbone of this volunteer organization and have achieved so much by improving our professional standing and qualifications leading to higher salaries in California. Thank you all for the support and confidence in our Board of Directors.

I would like to extend a warm welcome to our new members, who may be students on the path to a CLS license, new graduates in a laboratory setting, or those who have discovered your professional organization and how important it is for us to stand up and fight for our scope of practice and job security. You are the future of our organization. By volunteering you are helping others and yourself.

We have just changed the name of our primary membership category from “Active” to “Professional.” You do not have to be active to be a member, but we encourage you to do so. When you volunteer at CAMLT, you will gain life skills that will help you on the job and at home. You will also meet contacts and mentors that you can call upon as well as make life-long friends.

Please use your members-only login to:
1. Get contact information for your local CAMLT chapters and for your state officers.
2. Get the links for our corporate partners and save on travel and gifts.
3. Find out the latest information from our Governmental Affairs Committee.
4. Contact your District Consultant and help plan a social activity.
5. Become politically active to protect your license.

In the coming year, we will continue to work on our strategic plan. Our number one goal is increasing membership. Without new members and lifetime members, we will not have the funds for a legislative advocate in Sacramento to help us. The coming year is critical and we need everyone’s help to recruit members. Please do your part. All of the information you need to recruit new members is on the website. If you would like to participate in the statewide Membership Committee, please email the office.

Let’s welcome our newly elected officers: Mark Briones, District 3 Consultant, Adam Caughey, District 5 Consultant, Marc Bernaldez, Secretary and Josie Schrage, Treasurer. Thank you to Danuta Bowler, District 2 Consultant, Joyce Ma, District 4 Consultant, and Dora Goto, Past President who will continue to serve another year.

Thank you to Shareen Mezger, District 1 Consultant, and Marlene De Mers, District 5 Consultant. They have completed their term on the Board of Directors and will now help their chapters.

This past year, we have lost several members that have been instrumental to the success of our organization. They will forever be in our hearts and minds and I know it is their wish for others to step up and volunteer for CAMLT. Please make their wishes a reality.

Finally, as the holiday season approaches...be kind to one another and help CAMLT make this world a better place.

On behalf of the CAMLT Board of Directors and staff, I wish you a happy holiday season.

Sincerely,
Ilene Dickman
President, CAMLT
At the Student Forum, students from throughout the state networked, gave outstanding presentations using information learned in their training programs, and received scholarship awards from CAMLT.

The LAB-PAC Luncheon featured Assemblyman Ash Kalra from District 27. He spoke about his journey into politics, helping his community and how we can help in our own communities.

The LAB-PAC Walk/Run route went down the street by the new Forty-Niners Football Stadium.

Fun-Nite, sponsored by Tripbeat, was a musical smorgasbord of wild karaoke performed by individuals, groups (some with back-up singers), and some fine dancing. It was reminiscent of many past years of good fun.

The Installation Banquet is always the grand finale of our Convention where the officers are installed, the LAB-PAC drawing is held and other awards are given. One of the highlights was when the Fresno Chapter won not only the Berenice Stevens Award for chapter activities, but also the Newsletter award. Way to go Fresno Chapter...leading the way!
SFSU CLS training program instructors Nichole Coleman and Susan Kazarian had the opportunity to host the 2017 Student Forum at the CAMLT Annual Convention in Santa Clara. There was so much excitement in the air as students from various clinical laboratory science programs from all over the state came to share ideas, network with other students and be inspired for what lies ahead in their budding careers. Students presented topics that ranged from getting the word out to the youth about the profession to managing blood products in a hospital’s blood bank. Posters were also presented that caught the attention of many in the audience. Selene Jovel, from California State University, Dominguez Hills’ Clinical Science Program, was the poster winner with her topic on UCLA’s approach at reducing the risk of infectious diseases in platelet units.

The future is bright for these aspiring clinical laboratory scientists who seek opportunities for growth in the field. The keynote speaker, David Luong, spoke about his road to becoming a successful clinical laboratory scientist and inspired the audience through his journey. The Student Forum also featured past student attendees that provided their own perspective on what happens after their years in school and internship.

These were some of the experiences that the students shared:

**Calvin Chung**
“As a clinical lab student just getting his feet wet in the field, the convention was absolutely amazing and very informative. I enjoyed listening to the personal experience of previous CLS students and the success they are now achieving; their stories continue to get me through the didactic.”

**Erich Anderson**
“It was great to attend this year’s meeting! I was honored to learn that the CAMLT staff remembered my monitoring assistance in previous meetings, and asked if I would be willing to help that afternoon. Instead of just sitting in on an afternoon reviewing reactive lymphocytes, I was able to participate in the (very popular!) talk and get a chance to meet the speaker. Opportunities like these keep me interested in future events.”

**Victor Gavallos**
“I was grateful for the opportunity to attend the CAMLT Student Forum. It was a great exposure to other members of the CLS field and I learned quite a bit!”
BOARD OF DIRECTORS MEETING HIGHLIGHTS

The Annual Meeting always begins and ends with a Board of Directors meeting. As part of our plan to function more efficiently, we now have a short monthly on-line huddle in addition to our quarterly face to face meetings. This allows us to keep up momentum on projects and goals.

- SMART Goals to increase membership will be a priority again this year.
  - Each board member will create and implement them in their districts and chapters.
- The Membership Committee will be constantly monitoring and helping the chapters.
- Local Chapter revitalization will take place and be monitored.
- Our marketing program reached out to all 18,000 CLSs in California this year.
- Our revenue partners continue to increase the benefits we offer to our members including discounts on hotels, travel, flowers and gifts.
- CAMLT appointees continued their tradition by providing the majority of input to the Clinical Laboratory Technology Advisory Committee of Laboratory Field Services.
- Arrangements for next year’s convention adjacent to Disneyland were discussed.
THANK YOU TO OUR 2017 SPONSORS:

Abbott Diagnostics Division
Abbott Hematology
Alzheimer’s Foundation
ARUP Laboratories
Beckman Coulter
BioFire Diagnostics
Bio-Rad Laboratories
Diagnostica Stago
Inova Diagnostics
Precision BioLogics
Roche Diagnostics
Sysmex America
Tripbeat, endless vacation (Fun-Nite Sponsor)
UC San Francisco – School of Nursing

East Bay Chapter
Eastland Chapter
Fresno Chapter
In Memoriam

Our dear friend, colleague and mentor, Mary Jeanne Stavish passed away Sept 22, 2017, from complications of leukemia. More than 4 years ago, she was diagnosed with myelodysplastic syndrome which slowly progressed to AML earlier this year.

Mary Jeanne was born and raised in Junction City, Kansas, where she graduated class valedictorian from St. Xavier High School. She later obtained a Bachelor of Science degree in Medical Technology from Creighton University and in 1988, a Master’s Degree in Public Administration from the University of San Francisco.

Mary Jeanne moved to Los Angeles in 1965 to begin a career in medical technology; then moving to St. Luke’s Hospital in San Francisco a few years later. She remained at St. Luke’s until her retirement in 2014.

Mary Jeanne’s professional contributions to CAMLT go back many decades. Most recently, she served as our State Treasurer, newsletter writer and editor, Education and Research Trustee, and co-chair of the annual convention while battling this serious illness. It has been amazing to all of us how much she was able to accomplish during this struggle. Since joining CAMLT in 1975, she has served as San Francisco Chapter President and Delegate, State President, Secretary, Treasurer, Finance Chair, Bylaws Chair, Nominations Chair and E&R Foundation Chair. She was a pillar for our organization. Mary Jeanne was a bright spirit and an enthusiastic and charismatic mentor to many of us.

Mary Jeanne loved to travel, taking many trips throughout the United States and Europe. She was especially fond of the British Isles. A voracious reader, she loved a good British detective novel. She also loved to sing, and was a member of the San Francisco Bach Choir for several years, and the Marin Oratorio after moving to Novato. She loved the rehearsals, looking forward to spending time with the other members of the choir, and the days leading up to a performance was a time of joy and excitement.

Mary Jeanne was the oldest of five children, and the only girl. She is survived by her four loving brothers, Jim, Fred, Larry, Bill Jones and their families; and by her six stepchildren from her marriage to Joseph Stavish; Sheila (deceased), Susan Stavish Bremond, Andrew Joseph, Patricia Stavish Hinrichs, Jane Stavish, Jim, and their families.

Mary Jeanne was fun loving, witty, had a great sense of humor and a positive attitude. She was energetic and very organized and will be sorely missed by all who knew her.
CAMLT Education and Research Foundation Creates NEW Fund

Announcing the Emerging Leader Fund! The Education and Research Foundation, the California Association for Medical Laboratory Technology’s philanthropic arm, is soliciting funds to honor the many CAMLT leaders of the past and present. The Emerging Leader Fund is intended to celebrate CAMLT’s rich history, full of members who have stepped up over the years for the good of the laboratory community (both our profession and our association) by providing funds to assist emerging leaders move forward and take these memorable members’ place.

The monies in the Emerging Leaders Fund will be used to encourage CAMLT members to take workshops and/or courses in laboratory administration. This area is broad and includes topics such as quality assurance/quality control, human resources, safety, regulatory issues, and so on. It does not include workshops or courses in technical areas of the laboratory sciences.

Any CAMLT member may apply to use the funds to pay for a workshop or course that meets the criteria above. The maximum amount to be awarded for any one workshop or course is $500. The application must be received by the E&R chair no later than 4 weeks before the start of the workshop or course.

E&R Scholarships and Grants Awarded in 2017

Throughout the year, CAMLT’s Education and Research Foundation awards workshop, membership and student scholarships and grants. We are pleased to announce the winners for the 2017 year:

**Workshop Grants** of a full-day certificate for continuing education at a CAMLT Seminar were given to:
- Janet M. Jones, Sandra Mackewicz-Anderson, Erica Klein, and Romeo Domondon

**The Eleanor Kelley Award**, also a CE certificate, was presented to:
- Nerissa Caballes, Jamie Hagen, and Donna Low

**The Ruth Baldwin Award**, a one-year professional membership was given to:
- Emily Solleza

**Student Scholarships and Grants** were awarded during the Student Forum at the 2017 CAMLT Convention in Santa Clara. Students from across the State competed for scholarships and CLS Trainees from approved training programs in attendance were eligible for the annual grant drawing awarded by the Education and Research Foundation.

**Best Research Project Presentation Scholarship** of one-year professional membership to each of the members of:
- The SFSU/UCSF Team: Victor Gavallos, Alvin Phan, PingWah Poon, and Walt Wong

**Best Poster Session Scholarship** of one-year professional membership was presented to:
- Selene Jovel, CSUDH

**Clinical Laboratory Internship Grants** of $500 each were given to:
- Calvin Chung, SFSU, Selene Jovel, CSUDH, and Jeanette Sanchez, VCH

**Student Stipend Grants** of $100 each were given to:
- Erich Andersen, UCD
- Jennifer Cheung, SFSU
- Raoul Mark Eugenio, CSUCI
- Victor Gavallos, SFSU/UCSF
- Caitlin Hess, SJSU
Help Keep Quality in the Laboratory

Why is it important to maintain high quality laboratory tests? Accurate and timely laboratory test results directly correlates with better patient outcomes. Maintaining the integrity of lab personnel and facility standards are essential for accurate and timely laboratory test results. State licensure laws can and should provide higher standards. The adoption of high standards will ensure that patient and public health are better protected.

Licensure is the most well-known type of occupational regulation. Licensure refers to the right bestowed by a governmental agency or entity to engage in a legally defined occupational scope of practice. Licensure in California addresses the maintenance of a licensee’s skill through continuing education and competency requirements. It also provides a statewide benchmark for entry-level personnel. It is clear that laboratory operations, including testing, have a major role in assessing and managing patient health; nevertheless, special interest groups (e.g., optometrists, chiropractors, pharmacists, nurses, etc.) continuously lobby legislature to lower laboratory standards to allow them to perform laboratory tests or to supervise laboratories without requisite education and training. Therefore, CAMLT and their directly funded legislative advocates (Public Policy Advocates) must fight each and every day to maintain appropriate licensing standards for laboratory personnel and facilities.

It is ironic that only a fraction of California’s clinical laboratory professionals and patients are aware of the benefits or contributions of CAMLT. This is one of the many reasons why we as clinical laboratorians need to encourage support and active membership in our professional societies with active education of those outside our profession (e.g., legislative representatives, hospital administrators, nursing, patients…) that it takes more than just a college degree or high school education to do what we do on a daily basis – much specialized education and training is necessary to do the job right.

Now is the time to turn your beliefs into action; join as a member of CAMLT today. If you are already a member, thank you and please remember to renew on time. Help CAMLT safeguard standards that ensure patients receive high quality laboratory testing services now and in years to come.

Dora W. Goto,
CAMLT Immediate Past President
CAMLT LAB-PAC

Consider a donation to LAB-PAC. Through LAB-PAC you can help support candidates for state legislature who are in tune with the issues facing clinical laboratory science. A contribution to LAB-PAC ensures that your voice is heard. Your voluntary contribution, when added to the contributions of others, makes a real difference.

The annual CAMLT LAB-PAC “Share the Wealth” Fundraiser and Drawing takes place during the CAMLT Annual Meeting. Tickets are available all year round at State Seminar Events and at some Chapter Seminar Events. 50% of all ticket sale proceeds go toward prizes:

**First Prize:** 30% of total proceeds up to a maximum of $3,000
**Second Prize:** 15% of total proceeds up to a maximum of $1,500
**Third Prize:** 5% of total proceeds up to a maximum of $500

The 2017 LAB-PAC “Share the Wealth” Drawing winners are:

- **First place:** Bob Parada
- **Second place:** Jeannie Eleen
- **Third place:** Nancy Gutillla

Congratulations to all the winners!

Kathy Rees, Public Policy Advocates, LLC

L - J.J. Krivochev drawing a LAB-PAC winner. R - Joyce Ma drawing a LAB-PAC winner.
CAMLT POLITICAL UPDATE

LEGISLATURE

The California Legislature’s final day and night of the first year of the two-year legislative session ended in the wee hours of September 15. The Governor had until October 15 to sign or veto legislation. The PPA/ CAMLT agenda was dominated by optometrists wanting to expand their scope of practice to, among other things, order and perform waived lab tests without a lab director, Grifols and plasma centers wanting non-qualified personnel to do moderate complexity testing on plasma using the Reichert Protein Analyzer, and unions backing a bill to pay interns. In addition, PPA monitored a cross-section of bills from lab fees to antimicrobial infections to single-payer healthcare.

This session was not unlike every other over the 20 plus years that we have represented CAMLT. Though California requires higher laboratory personnel standards and requires licensing, every legislative session is marked by other allied health professions trying to expand their scope of practice to perform laboratory tests without the requisite education or lab director—pharmacists, primary care clinics, plasma collection centers, naturopaths, optometrists and chiropractors for starters. Without CAMLT, these many attempts to dilute or repeal laboratory and laboratory personnel licensing law would have succeeded.

RECRUIT NEW CAMLT MEMBERS! CONTRIBUTE TO LAB-PAC!

This last legislative session was rigorous in terms of bills legislating a frontal attack on the laboratory professions, depleting CAMLT resources. As expected, in the current legislative session, we are encountering the reintroduction of legislation that CAMLT and Public Policy Advocates successfully stopped from advancing in recent past legislative sessions. Only you can ensure the growth and vibrancy of a strong, well financed, well organized CAMLT to protect the best possible patient safety in laboratory testing and the preservation of your critical profession. Rise to the challenge. Recruit members to your professional organization —CAMLT. Contribute to LAB-PAC. Educate your own legislators. Only this will secure your future and the future of the patients that you serve.

LEGISLATION

The following is key legislation that PPA tracked or lobbied on behalf of CAMLT for the 2017-2018 session. Check the website for updates on bill status, Legislator lists, and Committee assignments.

AB 387 (Thurmond) Minimum Wage: Health Professionals: Interns, as amended 5/30/17 – OPPOSE

- This bill will require health care entities to pay allied health students minimum wage for time spent in clinical or experimental training that is required for state licensure or certification
- Clinical laboratory trainees/interns cannot provide laboratory services except under direct and responsible supervision, and as such, they should not be redefined as employees and clinical laboratories should not be re-defined as trainee/intern employers
- Increasing the cost of student training may force some laboratories to reduce or stop providing clinical rotations and/or stymie new laboratories from providing clinical rotations which will further reduce the number of new laboratory professionals entering the workforce and exacerbate existing clinical laboratory personnel workforce shortages

AB 387 would expand the definition of “employer” to include a person who directly or indirectly, or through an agent or any other person, employs or exercises control over the wages, hours, or working conditions of a person engaged in a period of supervised work experience to satisfy requirements for licensure, registration, or certification as an allied health professional and that any person engaged in a period of supervised work experience to satisfy requirements for licensure, registration, or certification as an Allied Health Professional be subject to the minimum wage law.

Clinical laboratory trainees/interns cannot release results and cannot work without supervision. Clinical laboratory rotations are funded exclusively by the host laboratory; costs are not reimbursed by Medi-Cal, Medicare, private insurance or other resources. Increasing the cost of student training may force some laboratories to reduce or stop providing clinical rotations and/or stymie new laboratories from providing clinical rotations which will further reduce the number of new laboratory professionals entering the workforce and exacerbate existing clinical laboratory personnel workforce shortages. Currently, many laboratories training students already pay a stipend that meet or exceed the minimum wage requirement proposed by this bill. Instead of legislating a minimum salary that some laboratories cannot afford, individual training laboratories should decide what they can afford to pay students so not to jeopardize the existing pipeline of students who eventually qualify to enter the workforce. SEIU is the Sponsor of the bill. Location: AB 387 was held on the Assembly Floor due to lack
of votes needed for passage and was subsequently made a 2-year bill. The measure is not eligible to be heard again until January 2018, but will face stringent deadlines. AB 387 would have to move out of the Assembly by January 31 – no easy task.

AB 443 (Salas), Healing Arts: Optometry: Required Examination: Notice, as amended 9/8/17 – WATCH
- Amends the current language with regard to diabetes testing to allow optometrists to collect blood specimen by the finger pricking method
- AB 443 was introduced as a “spot” bill which Public Policy Advocates flagged to watch for amendments. Originally an optometry bill dealing with examination/notice, the measure morphed into scope of practice legislation. The bill would revise the scope of the practice of optometry by providing that the practice of optometry includes the provision of habilitative optometric services. The measure additionally would authorize an optometrist to be certified in the administration of specified immunizations and would establish a fee for that purpose. AB 443 would also allow an optometrist to perform skin testing to diagnose ocular allergies limited to the superficial layer of skin, collect blood through skin puncture for diabetes testing, treat eyelid inflammation/inadequate eyelash growth and eliminates the protocols that specify when an optometrist must refer a patient to another provider. Previous scope of practice expansion optometry legislation which CAMLT opposed includes SB 492 (Hernandez) in 2013-14, which died on the Assembly Floor and SB 622 (Hernandez) in 2015-16 which was referred to committee but never heard. The Author’s office and Sponsors indicate that they will not change lab law in this bill this year. Location: AB 443 passed the Senate September 13 and the Assembly September 16. Governor Brown signed AB 443 into law October 7.

AB 613 (Nazarian), Healing Arts: Clinical Laboratories, as amended 8/29/17 — OPPOSE
- Would allow High School graduates to perform the moderately complex total protein refractometer test on potential plasma donors at plasma collection centers.
- Standards outlined in the bill for high school students performing this test does not ensure the health and safety of plasma donors.
- This measure is the reintroduction of AB 757 (Gomez) that CAMLT opposed and was ultimately vetoed by the Governor in 2015 due to concerns that the standards outlined in the bill for persons to perform this test does not ensure the health and safety of plasma donors. AB 613 authorizes a person with training set forth in the bill that exceeds federal Clinical Laboratory Improvement Amendments (CLIA) standards but allows non-qualified personnel under California laboratory law (BPC 1206.5(b)) to perform moderate complexity testing with regard to plasma. AB 613 would allow lesser trained and educated persons than currently permitted by law to perform a total protein refractometer analysis, categorized as a moderately complex test by the Food and Drug Administration, in a licensed plasma collection facility. If the protein refractometer test and/or calibration is done incorrectly there is potential to cause donor harm. AB 613 is sponsored by the Plasma Protein Therapeutics Association and is supported by Grifols and the California Chronic Care Coalition. Location: AB 613 is now a 2-year bill. The Sponsors maintain that they have yet to work out amendments relative to supervision and reporting standards related to unlicensed personnel performing total protein tests. This bill will be heard in the Senate in 2018.

AB 658 (Waldron) Clinical Laboratories, as amended 4/6/17 – NEUTRAL
- This bill proposes that annual licensure fee for clinical laboratories be suspended for two years (2018 & 2019)
- This measure is a result of the release on September 10, 2015 from the office of the State Auditor a report on the Laboratory Field Services (LFS) branch of the Department of Public Health which noted in its audit findings that since 2008 LFS has collected more than $12 million in lab fees that it has not spent. AB 658 proposes that by requiring LFS to suspend the annual licensure fee for clinical laboratories for two years (2018 & 2019), this will allow the Department to spend down the surplus in funds to an appropriate operating level. AB 658 is sponsored by the California Clinical Laboratory Association. Location: AB 658 passed both houses September 11 and chaptered by Secretary of State September 28.

AB 659 (Ridley-Thomas) Medical Reimbursement Rates, as amended 6/26/17 – NEUTRAL/WATCH
- This bill reduces the frequency by which clinical laboratories submit reports to every 3 years rather than annually beginning in 2019.
- Current law provides for the Medi-Cal program, which is administered by the State Department of Health Care Services, under which qualified low-income individuals receive health care services. The Medi-Cal
program is, in part, governed by, and funded pursuant to, federal Medicaid Program provisions. Existing law also restricts the Medi-Cal reimbursement rate for clinical laboratory or laboratory services, and also requires that laboratory service providers submit annual data reports to the department, for the purpose of establishing rates for clinical or laboratory services based on the lowest amounts other payers are paying providers for similar services. AB 659 reduces the frequency by which clinical laboratories submit reports to every 3 years rather than annually beginning in 2019. Location: AB 659 was approved by the Governor September 28.

HAVE YOU MEET WITH YOUR LEGISLATORS?
They are at home in their districts until January. Make sure to educate your elected officials about clinical laboratory issues! Meet with your legislators in your district, send letters explaining CAMLT’s philosophy, invite legislators and their staff to tour your laboratories, and introduce yourself as a constituent.

- **Which Legislator represents your home or laboratory?** Visit the current roster of Legislators and the cities they represent on our website or posted at: [http://www.legislature.ca.gov/legislators_and_districts.html](http://www.legislature.ca.gov/legislators_and_districts.html).
- **Visit their offices.** Make an appointment with your Legislators’ District offices.
- **EDUCATE!** Explain to Legislators and their consultants what it takes to be a CLS, MLT or CPT; what you do; why it is important to maintain the integrity of the Laboratory Director when other personnel are doing laboratory tests, even if they are waived; why other allied health providers shouldn’t be Laboratory Directors; the laboratory personnel shortage and what it takes to eliminate it.

Make it a priority to meet with your Legislators. Remember, these interactions are integral components of your grassroots program. For tips, please refer to the CAMLT Grassroots Guide and Talking Points on the website.

There are still opportunities to stop AB 613 (Nazarian), protein refractometer testing performed by unlicensed personnel in the Senate if you inform your State Senator today. Consider writing a letter to your State Senator; sample letter is posted at: [http://camlt.org/wp-content/uploads/2017/10/AB-613-Senate-Opposition-sample-letter-protein-refractometer.docx](http://camlt.org/wp-content/uploads/2017/10/AB-613-Senate-Opposition-sample-letter-protein-refractometer.docx) and/or visit with your Senator in their District Offices. Helpful tips on how to meet with and/or find your legislative representatives can be found at [http://camlt.org/have-you-met-with-your-legislator-if-not-why-not](http://camlt.org/have-you-met-with-your-legislator-if-not-why-not).

Kudos to Danuta Bowler and Dora Goto for meeting with Assemblywoman Catharine Baker (top center) and Ilene Dickman and Eiko Amano for meeting with Senator Anthony Portantino (bottom left). Let CAMLT know (office@camlt.org) when you meet with your legislative representatives. Together we can maintain and improve high quality in laboratory testing by fostering education and working to ensure that legislators understand the impact of new bills on laboratory results and patient care.

STRENGTHEN YOUR VOICE: CONTRIBUTE NOW!
Please donate to the CAMLT LAB-PAC fund. LAB-PAC is a critical means of supporting and electing Legislators to the California Legislature who share a like-minded philosophy with CAMLT and who are open-minded to learning the issues and challenges facing your profession. Encourage the colleagues you work with. Get your chapters and chapter members to contribute. Talk to your vendors. Get involved! Your voice in the political process is much louder as CAMLT than as an individual. Contribute to the collective resources of CAMLT to grow your political clout. Visit the LAB-PAC Page for a donation form or to donate online. Your gift in any amount will help your profession. Contribute now!

Please mail donations made payable to:
CAMLT LAB-PAC
39656 Mission Boulevard, Fremont, CA 94539

Please write a check or donate online to LAB-PAC now!
HEMATOLOGY CASE STUDY: A HYPOCHROMIC, MICROCYTIC ANEMIA

Course Number: DL-922
1.0 CE
Level of Difficulty: Basic

Helen M. Sowers, MA, CLS,
Professor, Dept. of Biological Science (retired); CA State University, East Bay

CASE: A 19 year old man (C.C.) had been competing as an amateur boxer. He was successful enough to turn professional. He found his stamina decreased in the longer pro-boxing bouts, making him less competitive in the professional ranks. Concern regarding his boxing future caused him to consult a physician. The physical exam was normal. His CBC yielded the following results:

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULTS</th>
<th>REF. RANGE*</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CONVENT. UNITS</td>
<td>SI UNITS</td>
</tr>
<tr>
<td>WBC</td>
<td>9.5 x 10³/µl</td>
<td>9.5 x 10⁹/l</td>
</tr>
<tr>
<td>RBC</td>
<td>5.35 x 10⁶/µl</td>
<td>5.35 x 10¹²/l</td>
</tr>
<tr>
<td>Hgb</td>
<td>10.5 g/dl</td>
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</tr>
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<td>67 fl</td>
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<tr>
<td>MCH:</td>
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<td>19.6 pg</td>
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<tr>
<td>MCHC:</td>
<td>29.2 g/dl</td>
<td>292 g/l</td>
</tr>
<tr>
<td>RDW:</td>
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<td></td>
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<tr>
<td>Platelets</td>
<td>260 x 10³/µl</td>
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<td>MPV</td>
<td>10.5 fl</td>
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</tbody>
</table>

*Harmening (Ref. 1)

The RBC morphology on the peripheral blood smear showed microcytosis with slight hypochromia. A few target cells and slight anisocytosis were noted.

The physician, noting the low hemoglobin and hematocrit, prescribed oral iron and ordered a test for the most common source of unknown bleeding in adult males, a stool occult blood. The test was negative. After 2 months of iron therapy C.C. reported no improvement in his endurance. A repeat CBC at this time showed similar results to the first one. At this point the physician consulted with the hematology Clinical Laboratory Scientist before ordering additional tests.

Consider the questions

1. What are the causes of hypochromic, microcytic anemias?
2. What tests are used to differentiate among them?
**COURSE OBJECTIVES**: at the end of the course the participant will be able to
1. List the causes of hypochromic, microcytic anemias
2. Identify tests used to differentiate among hypochromic, microcytic anemias
3. State the globin chain composition of the various hemoglobins mentioned
4. Differentiate between the genetic causes of alpha thalassemia and beta thalassemia
5. Discuss the clinical manifestations of homozygous versus heterozygous states of the defective genes
6. Describe the red cell morphology associated with thalassemia minor
7. Differentiate between alpha thalassemia minor and beta thalassemia minor
8. Evaluate and compare laboratory tests and morphology between thalassemia minor and iron deficiency anemia

**DISCUSSION**: The causes of hypochromic, microcytic anemias are iron deficiency (the most common), anemia of chronic disease, thalassemia, sideroblastic anemia, and lead poisoning. They may be differentiated by the tests in the following Table 1:

<table>
<thead>
<tr>
<th></th>
<th>RDW</th>
<th>Serum Iron</th>
<th>TIBC</th>
<th>Ferritin</th>
<th>FEP</th>
<th>A2 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron deficiency</td>
<td>Inc</td>
<td>Dec</td>
<td>Inc</td>
<td>Dec</td>
<td>Inc</td>
<td>Nor</td>
</tr>
<tr>
<td>Chronic disease</td>
<td>Nor</td>
<td>Dec</td>
<td>Dec</td>
<td>Inc</td>
<td>Inc</td>
<td>Nor</td>
</tr>
<tr>
<td>αThalassemia trait</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
</tr>
<tr>
<td>βThalassemia trait</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Inc</td>
</tr>
<tr>
<td>Sideroblastic</td>
<td>Inc</td>
<td>Inc</td>
<td>Nor</td>
<td>Inc</td>
<td>Inc</td>
<td>Nor</td>
</tr>
<tr>
<td>Lead poisoning</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Nor</td>
<td>Inc</td>
<td>Nor</td>
</tr>
</tbody>
</table>

RDW = red cell distribution width, TIBC = total iron binding capacity, FEP = free erythrocyte protoporphyrin

*Adapted from Harmening (Ref. 1)

The physician ordered serum iron, ferritin, and FEP. The results were within reference ranges, eliminating iron deficiency, anemia of chronic disease, sideroblastic anemia, and lead poisoning. This resulted in a provisional diagnosis of Thalassemia minor. At this point, what other information would be useful to confirm the diagnosis?
THALASSEMIA

The Thalassemias are a heterogeneous group of hereditary diseases of hemoglobin synthesis involving decreased production of one of the hemoglobin globin chain types. Normal adult hemoglobin is composed of 95 - 97% Hb A (2α and 2β chains), 2 – 3% Hb A2 (2α and 2δ chains), and 2% Hb F (fetal hemoglobin, 2α and 2γ chains). The 2 principal types of Thalassemia are alpha Thalassemia and beta Thalassemia, depending on which chains are affected. The following shows a general classification:

**NORMAL**

<table>
<thead>
<tr>
<th>HEMOGLOBIN F</th>
<th>α2γ2</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEMOGLOBIN A</td>
<td>α2β2</td>
</tr>
</tbody>
</table>

**ALPHA THALASSEMIA**

<table>
<thead>
<tr>
<th>[α2γ]2</th>
<th>excess gamma chains, Hb Bart’s</th>
</tr>
</thead>
</table>

**BETA THALASSEMIA**

<table>
<thead>
<tr>
<th>α2γ2</th>
<th>Hb F persists beyond infancy</th>
</tr>
</thead>
</table>

or indicates decreased production

**ALPHA THALASSEMIA**

Alpha thalassemia is decreased production of alpha chains. Alpha chain production is controlled by 4 genes, 2 on each chromosome 16. The genetic mechanism is gene deletion. Alpha thalassemia is evident at birth because alpha chains are required for all hemoglobins: fetal, A2, as well as A. Thus Hb F, usually comprising 50-85% the hemoglobin at birth, is not present to carry O2 at this time. The severity of alpha thalassemia depends on the number of genes deleted as seen in Table 2.

**TABLE 2**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Genotype</th>
<th>Clinical Feature</th>
<th>Newborn Hb pattern</th>
<th>&gt;First Year Hb pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrops fetalis</td>
<td>-/-ααα</td>
<td>Fetal or neonatal death</td>
<td>Hb Bart’s &gt;80%</td>
<td>Hb Bart’s &gt;80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hb H, Hb Portland</td>
<td></td>
</tr>
<tr>
<td>Hb H disease</td>
<td>-/-ααα</td>
<td>Chronic hemolytic anemia</td>
<td>Hb Bart’s 20-40%</td>
<td>Hb H 5-30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hb Bart’s 20-40%</td>
</tr>
<tr>
<td>Thalassemia minor</td>
<td>-/ααααα</td>
<td>Slight anemia, Micro, hypo RBC</td>
<td>Hb Bart’s 2-10%</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silent Carrier</td>
<td>αααα/ααα</td>
<td>No hematologic or clinical abnormal.</td>
<td>Hb Bart’s 1%</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>αα/αααα</td>
<td>No hematologic or clinical abnormal.</td>
<td>Hb Bart’s 0-trace</td>
<td>Normal</td>
</tr>
</tbody>
</table>
Deletion of all 4 genes is incompatible with life. Hb H disease has some production of Hb A but Hb H (β4) is unstable and precipitates in the cells, causing increased hemolysis of RBCs.

Alpha thalassemia minor can be caused by both genes deleted on one chromosome or 1 gene deleted on both chromosomes. Deletion of only one gene causes no apparent consequences, a condition called a silent carrier.

Alpha thalassemia is more commonly found in Southeast Asia, less commonly in the Mediterranean, and sporadically in other parts of the world.

Other genetic abnormalities that cause alpha chain elongation, such as Hb Constant Spring, Hb Seal Rock, Hb Koya Dora, or Hb Icaria, result in decreased alpha chain production with effects similar to alpha gene deletion. Other genetic causes of decrease in alpha chain production have been identified, giving geneticists much fodder for investigation.

**BETA THALASSEMIA**

There are 2 genes for production of beta chains, one on each chromosome 11. The genetics of decreased production of beta chains is more complex than that found in alpha thalassemia. β-thalassemias are heterogeneous at the molecular level. More than 200 disease-causing mutations have been identified to date. The large majority of mutations are simple single-nucleotide substitutions, or deletion or insertion of oligonucleotides leading to a frameshift. Rarely, the β-thalassemias are the result of gross gene deletion. A number of different genetic backgrounds have been described, usually associated with a different geographic area. Beta thalassemia is commonly found in the Mediterranean Sea area (‘thalassa’ means sea). It is particularly common in northern Italy, Greece, Algeria, and Saudi Arabia and can also be found across southern Asia to Southeast Asia. The clinical severity of beta thalassemia is variable, depending on the type of genetic defect or the combination of defects. Severe beta thalassemia is not evident until the infant is several months old since Hb F is produced in adequate quantities until then. The main categories of genetic defects are β⁺ and β⁺⁺. β⁺ gene produces no beta chains. β⁺⁺ gene produces variable amounts of beta chains depending on the specific genetic inheritance. There are several other genetic defects: Hb Lepore, which results from unequal crossover between delta and beta genes, and δβThal, a combined defect of delta and beta chain synthesis. These are less common and will not be discussed further. The following table gives a brief overview of beta thalassemias:

<table>
<thead>
<tr>
<th>TABLE III-A Severe thalassemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syndrome</td>
</tr>
<tr>
<td>β⁺ thalassemia</td>
</tr>
<tr>
<td>β⁺ thalassemia</td>
</tr>
<tr>
<td>β⁺β⁺ heterozygote</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE III-B Thalassemia minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syndrome</td>
</tr>
<tr>
<td>β⁺ thal minor</td>
</tr>
<tr>
<td>β⁺⁺</td>
</tr>
</tbody>
</table>
LABORATORY FINDINGS IN THALASSEMIA

The main focus of this course is thalassemia minor, but a brief discussion of the more severe thalassemias follows:

**Thalassemia major:**
Anemia is profound – Hb 2-3 g/dl (Hb 20 to 30 g/L). Hematocrit and RBC count are also decreased, hence the indices are uniformly depressed. The MCV, MCH and MCHC are all decreased. The RDW is increased due to anisocytosis. The blood smear shows marked hypochromia and microcytosis with extreme anisocytosis and poikilocytosis with bizarre shapes, target cells, ovalocytosis, Cabot rings, Howell Jolly bodies, nuclear fragments, basophilic stippling, siderocytes, and often large number of nucleated RBCs.

**Hemoglobin H disease:**
The peripheral smear shows hypochromia and microcytosis, target cells, mild to moderate anisopoikilocytosis. Incubation of blood with brilliant cresyl blue supravital stain will cause precipitation of Hb H in the erythrocytes seen as multiple “golf ball like” inclusion bodies.

**Thalassemia minor:**
Thalassemia minor is common, particularly in areas where there are people of Mediterranean, Southeast Asian, and African ancestry. As was illustrated by the case study, the causes of a low hemoglobin and hematocrit must be differentiated. In the absence of clinical symptoms, giving a course of oral iron therapy and evaluating the result is not a recommended procedure to assure quality patient outcomes. Because iron overload may result, assessment of serum iron, ferritin, TIBC, and FEP will better determine the probable cause. Decreased serum iron would indicate iron deficiency or anemia of chronic disease; increased serum iron would indicate sideroblastic anemia and increased FEP along with normal serum iron would be characteristic of lead poisoning. Again, referring to the question posed at the end of the case study, what other information would be useful to confirm the diagnosis?

In this patient, a healthy active young man, anemia of chronic disease and lead poisoning are unlikely. Iron deficiency is ruled out by the unresponsiveness to iron therapy. Knowledge of the individual’s racial background might be useful. In this case, he was of Italian descent. This particular ancestry coupled with the decreased MCV and MCH that are not corrected with iron therapy targets a diagnosis of Thalassemia minor. The next step is to determine the type of thalassemia. Hemoglobin electrophoresis may be useful in demonstrating the type of thalassemia by showing the presence of Hb A2, Hb F, Hb H, Hb Constant Spring, Hb Lepore or other structurally abnormal hemoglobins. In this case Hb A2 was increased (5%) and Hb F was 4.5%. Thus, there is corroboration of beta thalassemia minor.

Diagnosis of thalassemia minor is important in order to reassure the patient that the levels of hemoglobin and hematocrit are normal for him and he should not be placed on iron therapy, which could lead to iron overload. Also the patient needs to be counseled that if he marries a woman who is a carrier of beta thalassemia, hemoglobin E or hemoglobin S, there may be significant consequences in their children.

Alpha thalassemia minor is harder to diagnose than beta thalassemia minor because the levels of Hb A2 and Hb F are not increased. Frequently it is a diagnosis made by exclusion. Again knowing the patient’s racial background is useful. The hematological values along with other clues, such as racial background, will help.
There are several ways a laboratorian may suspect that the patient has a thalassemia minor from the initial CBC. In particular it is important to differentiate between thalassemia minor and iron deficiency. In thalassemia minor the hemoglobin and hematocrit are decreased but the RBC count is not correspondingly low and frequently is in the normal range, resulting in discordance in the indices. (The MCV is slightly decreased and the MCH is decreased but the MCHC is near normal). Also the cells tend to be a similar size so the RDW is normal. In contrast, in iron deficiency the RBC count is usually relatively lower and there is significantly more anisocytosis, thus the indices are in concordance and the RDW is increased. A mathematical manipulation of the indices has been used to help differentiate between thalassemia minor and iron deficiency. One of the formulas is Mentzer’s, as follows:

\[
\begin{align*}
\text{MCV} & \quad \text{If the result is } <13, \text{ then thalassemia minor} \\
\text{RBC} & \quad \text{If the result is } >13, \text{ then iron deficiency}
\end{align*}
\]

The red cell morphology on the blood smear may also give indication of whether the patient has thalassemia minor or iron deficiency. The morphology seen in thalassemia minor is hypochromic, microcytic with slight anisocytosis, mild to moderate poikilocytosis, target cells and frequently basophilic stippling. The smear is characterized by having a majority of similar appearing red blood cells. The morphology in iron deficiency shows hypochromia, microcytosis, moderate anisocytosis, mild to moderate poikilocytosis—ovalocytes, “pencil cells” (long elliptical forms), folded cells, usually no basophilic stippling.

The differences are that thalassemia minor has similar sized cells, usually no pencil shaped cells and may show basophilic stippling while iron deficiency has moderate anisocytosis, more poikilocytosis, especially pencil shaped cells, and no basophilic stippling. An individual’s iron stores must be determined. Serum ferritin is a good indicator of the level of stored iron. In iron deficiency there are decreased stores of iron as indicated by decreased serum ferritin. In thalassemia minor there are normal iron stores. (refer to Table I)

CONCLUSION
In this course we have discussed the causes of hypochromic, microcytic anemias: iron deficiency, \(\alpha\) thalassemia, \(\beta\) thalassemia, anemia of chronic disease, sideroblastic anemia, and lead poisoning. These anemias may be differentiated by the laboratory tests shown in Table I along with clinical history. Emphasis was placed on the causes and identification of thalassemias, in particular the types of thalassemia minor. Identifying and differentiating thalassemia minor from iron deficiency anemia may be done by evaluating the serum iron and ferritin levels, the FEP, and TIBC. Cellulose acetate electrophoresis may differentiate between \(\alpha\) thalassemia and \(\beta\) thalassemia.

REFERENCES
REVIEW QUESTIONS
Select the one best answer.

1. A patient with hypochromic, microcytic anemia has increased serum iron, increased RDW, increased ferritin, increased FEP. What is the most probable diagnosis?
   a. lead poisoning
   b. sideroblastic anemia
   c. anemia of chronic disease
   d. thalassemia minor

2. Using Table I, which test would differentiate between alpha thalassemia minor and lead poisoning?
   a. Hgb A2
   b. TIBC
   c. ferritin
   d. FEP

3. At birth in alpha thalassemia there is an increase of Hb Bart’s. Hb Bart’s is composed of which of the following?
   a. 4 α chains
   b. 4 γ chains
   c. α2γ2
   d. 4 δ chains

4. Severe beta thalassemia is not diagnosed until after the infant is several months old because
   a. Hb F is present in sufficient quantities in young infants.
   b. The extra hemoglobin in newborns takes 2 months to decrease.
   c. Hb A2 is present in sufficient quantities to substitute for HbA
   d. Hemoglobin from the mother lasts for about 2 months.

5. The genetic mechanism associated with alpha thalassemia is
   a. mutation in intervening sequences in the gene
   b. includes unequal crossover (Hb Lepore)
   c. deletion of one or more genes
   d. mutation in the promoter area

6. A useful test to differentiate between alpha thalassemia minor and beta thalassemia minor is
   a. RDW
   b. FEP
   c. Hb A2
   d. presence of stippled cells on blood smear
7. A patient has the following values on the CBC:
   
   - RBC: $4.02 \times 10^{12}/l \ (4.2 \times 10^6/\mu l)$
   - MCV: 79.6 fl
   - Hgb: 90 g/l (9.0g/dl)
   - MCH: 22.4 pg
   - Hct: 320 l/l (32.0%)
   - MCHC: 281 g/l (28.1/dl)
   - RDW: 16.2%

   The differential diagnosis is iron deficiency anemia or thalassemia minor. Which of the values is the most help in differentiating between the two?
   
   a. RDW
   b. MCV
   c. Hct
   d. MCH

8. A Mentzer calculation of the values from the patient in Question #7 would indicate that patient has
   
   a. an iron deficiency anemia
   b. thalassemia minor
   c. thalassemia major
   d. anemia of chronic disease

9. Differences in RBC morphology between thalassemia minor and iron deficiency anemia include evaluating
   
   a. the amount of microcytosis
   b. presence of target cells
   c. presence of ovalocytes
   d. presence of stippled cells

10. Inheritance of $\beta^+$ $\beta$ genes results in which of the following clinical conditions in the individual?
    
    a. thalassemia major
    b. thalassemia intermedia
    c. thalassemia minor
    d. no clinical abnormality
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<td>Ebola Virus Disease [B]</td>
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<td>DL-011</td>
<td>Measles – United States 2014 [B]</td>
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<td>DL-008</td>
<td>Cryptosporidiosis [B]</td>
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<td>DL-007</td>
<td>Giardiasis [B]</td>
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<td>Rare Antibody: Hemolytic Disease of the Fetus &amp; Newborn [I]</td>
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<td>Listeriosis – Foodborne Disease [B]</td>
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<td>Viral Hepatitis: Causes, Diagnosis, and Treatment [B]</td>
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<td>Diseases Caused by Fusobacterium necrophorum [I]</td>
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<td>Diagnosis of Malaria in the U.S. [I]</td>
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Two-unit (2.0) CE Courses

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<td>Diagnosis of Malaria in the U.S. [I]</td>
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<tr>
<td>DL-001</td>
<td>Chlamydia &amp; Neisseria [A]</td>
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   5 4 3 2 1
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   5 4 3 2 1
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Membership Categories:

[ ] Professional - $120 annually
An individual who 1) Holds a license or certification in a clinical laboratory profession issued by the California Department of Public Health or 2) Holds a baccalaureate degree from an accredited college or university and is eligible to sit for a CDPH approved examination; or 3) Holds a Masters or Doctorate degree in science, education or administration and is actively employed in clinical laboratory science.

[ ] Associate - $75 annually
An individual who has an interest in the field of clinical laboratory science and/or supporting the purposes or goals of CAMLT, but is not otherwise eligible for membership.

[ ] Student - $10 annually
An individual who possesses a valid training license from Laboratory Field Services or who is enrolled in an LFS approved program leading to licensing as a CLS, or MLT or certification as a CPT. Students at accredited universities or colleges that lead to eligibility for licensure or certification from LFS are also eligible to join as student members.

[ ] Lifetime - $1250 one time fee
Meets Professional member requirements and submits the one time application fee.

[ ] 20/20 Option - Additional $20 annually
An additional $20 payment at the time of application or renewal entitles the member a 20% discount on CAMLT state sponsored C.E. fees for the year (not applicable to Distance Learning).

Membership Dues _________
20/20 Option _________
Total payable to CAMLT _________
LAB-PAC Contribution (separate check) _________
E & R Foundation Donation (separate check) _________

Notes, Comments, Promo Codes

Applicants are considered for membership in the category which meets their maximum qualifications.
I declare that in making application for membership, I have met the qualifications listed for the category to which I am applying.

Applicant Signature ____________________________
Recruiter (if known) ____________________________

CAMLT asks you to contribute to one or both of these worthwhile entities:

LAB-PAC
The CAMLT Political Action Committee helps your association advocate on behalf of you and your profession. Help support quality clinical laboratory medicine in the California legislative arena.
LAB-PAC contributions are NOT tax deductible.
You must be a U.S. citizen to donate.

Education and Research Foundation
Your tax deductible contribution supports scholarship programs, outreach efforts and students pursuing careers in the clinical laboratory sciences.
Separate checks should be enclosed for each of these worthy causes.
# 2018 Continuing Education Calendar

Program planning in progress
Watch [www.camlt.org/calendar](http://www.camlt.org/calendar) for details

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<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
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<tr>
<td>March 3</td>
<td>Eastland and Foothill Chapters’ Spring Symposium</td>
<td>City of Hope</td>
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<tr>
<td>March 3-4</td>
<td>Tulare/Kings Chapter Seminar</td>
<td>Visalia</td>
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<td>March 10-11</td>
<td>Fresno Chapter Seminar</td>
<td>Fresno</td>
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<td>March 17-18</td>
<td>Spring Seminar South</td>
<td>Kaiser Regional Laboratory, North Hollywood</td>
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<td>April 21-22</td>
<td>Spring Seminar North</td>
<td>UC Davis Medical Center, Sacramento</td>
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<tr>
<td>September 28-29</td>
<td>CAMLT’s 79th Annual Meeting, Exhibits &amp; Workshops</td>
<td>Wyndham Anaheim Garden Grove</td>
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